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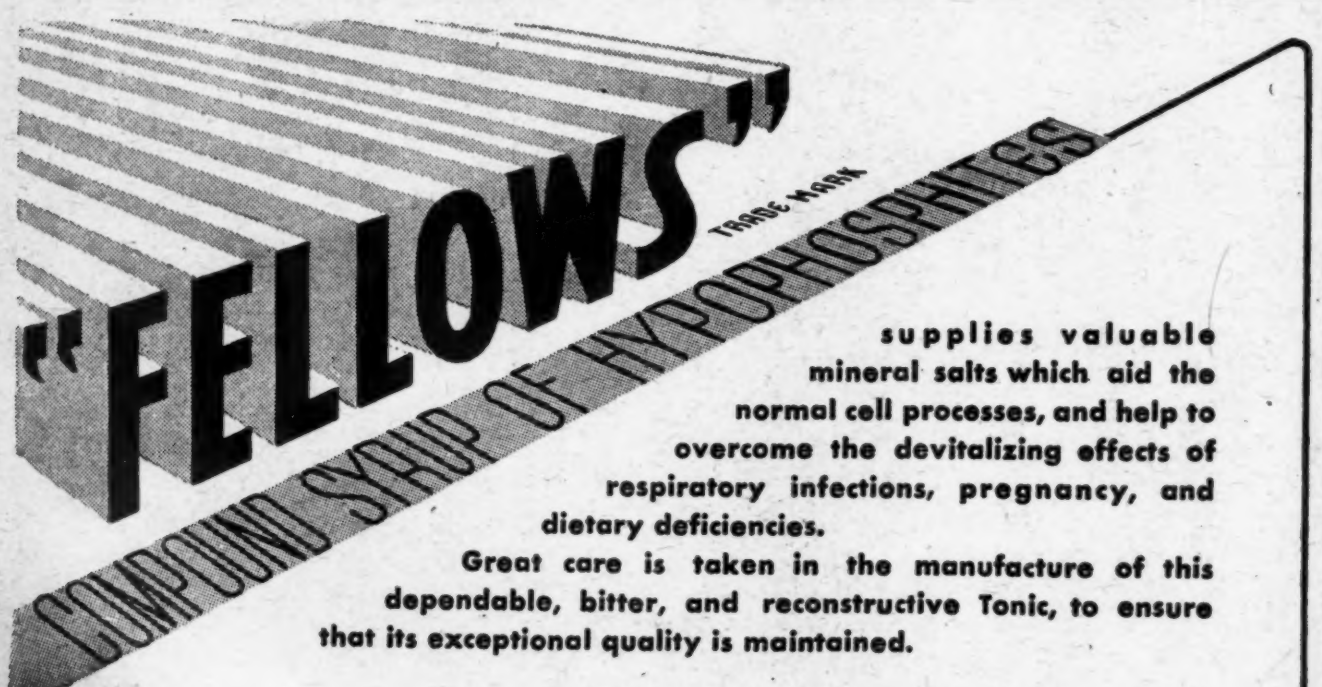

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BRITISH MEDICAL JOURNAL

LONDON SATURDAY JULY 5 1941

THE TREATMENT OF BURNS AND WOUNDS BY THE ENVELOPE METHOD

BY

JOHN BUNYAN, *Surgeon Lieut.-Commander (D), R.N.V.R.*

(WITH SPECIAL PLATE)

Introductory Remarks

The outbreak of war has naturally resulted in much research into the treatment of burns and wounds. Experience has led to the modification and even rejection of some previously accepted methods of treatment. The most notable incident has been the discovery of the disasters that may follow the application of tannic acid to the hands and face. Some of the therapeutic advance up to date has been of an empirical, trial-and-error type, and has left much room for improvement. The scientific theoretical aspect of the question is still, it is suggested, capable of further development.

My interest in inflammatory disorders and wounds of the mouth led me to form certain hypotheses and opinions on the problem of the local treatment of inflammatory conditions in general. My theoretical views were as follows:

First, sound healing of the tissues is assisted by gentle but thorough cleansing, with removal of dead tissue and avoidance of irritant applications, together with every encouragement to the physiological outpouring of serum and leucocytes into the injured area. This assistance is, of course, strengthened by any bactericidal treatment that can be given without damage to living cells and by the prevention of secondary infection.

Secondly, it is desirable that any treatment given should be painless, and, if possible, alleviate existing pain, and that it should reduce to the minimum the necessity for general anaesthesia. It would be a great advantage if the local treatment permitted the active and passive movements of the injured part at all times.

Thirdly, a local treatment of burns should have the following qualities: it should not aggravate primary shock; it should diminish and inhibit the loss of body fluid from the burnt area; it should reduce toxaemic shock from the absorption of protein breakdown products and bacterial toxins; and it should disinfect without irritating or damaging the healing tissues.

In the past less success than was hoped for has followed the treatment of burns and wounds because irritating, destructive antiseptics were used, which killed tissue as well as organisms. At the same time the type of frequently changed dressing, conventionally applied, gave rise to pain on removal, to destruction of newly formed tissue to which it was adherent on each removal, and to immobility and disuse of the part to which it was applied. Frequent changing of a dressing introduced the inescapable danger of secondary infection from such sources as droplets from the nose and mouth of other individuals or from ward dust.

To obtain improvements in the local dressing of burns and wounds it is therefore desirable to employ a dressing which may be kept applied without changing for a considerable period—preferably during the whole course of treatment. The dressing should be flexible, frictionless, bland to the tissues, and, if possible, transparent, in order that progress may be constantly observed. The dressing should combat bacterial contamination and be watertight, so that fluids applied to the injured area would be confined within bounds.

Apart from avoiding the necessity for changing, the dressing should permit free movement if this is desirable, and permit constant drainage and cleansing of the affected area.

The Therapeutic Agent

In attempting to devise an improved form of dressing to meet the above-mentioned requirements, the form of solution to be applied to burns and wounds was attended to first. It was desired to find one which was non-toxic, non-irritant, capable of dissolving dead organic matter, able to encourage transudation of serum and cells, and to exert some bactericidal power in concentrations that would be harmless to healing tissue, and which would be easily obtainable anywhere and at any time.

From personal clinical experience, and from literature on the subject, it was decided that sodium hypochlorite solutions most fulfilled these desiderata, and that the hypochlorite solution produced by electrolysis of sodium chloride was the best preparation, having the least irritant action. The following are a few important points in the manufacture of hypochlorite solutions.

First, sodium hypochlorite solution can be made by a chemical process. Chlorine gas can be passed through dilute caustic-soda solution at suitably low temperatures. The reaction is as follows:

$$2NaOH + Cl_2 = NaOCl + NaCl + H_2O.$$

In solutions prepared this way sodium hypochlorite and sodium chloride will usually be found in equal quantities, but there will always be an excess of caustic soda remaining in solution.

Sodium hypochlorite solution can also be made in an indirect chemical manner by the use of bleaching powder. The danger of causticity is present in this method also, as exemplified in the case of liq. sod. chlorinatae (B.P.C.). In Dakin's solution causticity is reduced by the addition of boric acid, but some of this is absorbed by the tissues, so that free soda is always present. Calcium hypochlorite solution made from bleaching powder is also combined with boric acid to form eusol.

In all solutions made from bleaching powder there is one serious disadvantage—namely, the variability in composition of the bleaching powder. Careful analysis is necessary before a final product of definite strength and alkalinity is obtained. It is impracticable to carry out such an analysis every time one of these solutions is made up in a dispensary or hospital.

Secondly, sodium hypochlorite can be manufactured electrolytically from the electrolysis of brine. The reaction can be expressed in the following equations:

$$NaCl = Na^{1} + Cl^{1}.$$
$$2Na + 2H_2O = 2NaOH + H_2.$$
$$2NaOH + Cl_2 = NaOCl + NaCl + H_2O.$$

There is evidence to suggest that the increased efficacy of electrolytic sodium hypochlorite as compared with the chemical form is due to the presence of ozone. Electrolytic sodium hypochlorite has an oxidizing action on organic matter. Glycerin, for example, can be converted by successive stages to oxalic acid. Proteins, pus, mucus, etc., are dissolved and converted to inoffensive products. In the case of proteins chloramines are formed, which in themselves perhaps have some degree of germicidal action.

Unlike any other antiseptic, electrolytic sodium hypochlorite is completely non-toxic. HOCl gives either of two actions—oxidizing or chlorinating. The end-product from oxidizing is NaCl, and from chlorinating H_2O. Electrolytic sodium hypochlorite is thus the nearest approach to a physiological and natural cleansing medium. On living tissue, in proper dosage, the effects are beneficial and stimulating to growth, in contrast with the destructive action on necrotic tissue. This automatic selectivity—the property of differentiating between dead organic matter to be dissolved* and live tissue to be repaired—is a most interesting one.

Electrolytic sodium hypochlorite does not dissolve necrotic matter quite so well as chemical hypochlorite because the latter contains alkali, but this difference is unimportant compared with the freedom from causticity of the former.

The use of hypochlorites has been criticized because of the process of inactivation: when brought into contact with dead organic matter the hypochlorite is broken down and therefore cannot continue to exert a bactericidal action. It is partly in this property that its value lies, and it is only necessary to provide a continual supply of solution for a given period to take the utmost advantage of it. In order to get the greatest value from the solution it was considered important to use a large quantity of a low concentration rather than a small quantity of a high concentration.

The Dressing

Having decided to employ electrolytic sodium hypochlorite, the next step was to devise some method of applying the solution to the injured area in a simple manner and in such way that it could be left in contact with the tissues for as prolonged a period as desired. The allowance of adequate time to exert its full effect is important in treating sepsis with sodium hypochlorite.

A dressing made from rubber sheeting with tyre valves as inlet and outlet was tried on an old injury dating from the last war. The clinical result was excellent, but the rubber apparatus was by no means satisfactory. An injured limb was then put up in plaster, with a window of celluloid inserted over the wound, and hypochlorite solution was pumped in through a Higginson syringe three times a day for twenty minutes. Again the results were excellent clinically, but the method had many mechanical drawbacks.

It was at this time that we had the extreme good fortune to interest Mr. Wm. Stannard of Leek in our idea. He agreed to make an envelope of oiled cotton which would allow a fluid to be pumped in and let out while attached to the limb. The first one made was very crude, but was good enough to show that the idea had many possibilities. Shortly afterwards better envelopes were made, and these were tried out on several cases of burns and wounds. The results were such that encouragement was given to develop the idea, and during the past eight months Mr. Stannard has devoted himself entirely to the perfecting of the coated silk, so that it is now impermeable to electrolytic sodium hypochlorite, transparent, and absolutely bland to the tissues. The designing of the envelopes and the most efficient method of sealing to the limb also presented many problems that he has successfully overcome. The standard of perfection arrived at is such that it is now considered possible to release the envelopes to the profession with confidence.

It must here be stressed that the method is very new, and that far more time than six months is required in order to perfect not only the mechanical but the treatment side of the system.

Every facility was offered by Mr. Vaughan Hudson at the Middlesex Hospital, and Dr. Bruce Pearson at King's College Hospital. Mr. J. W. Hannay, at the London Hospital, took an active part in trying out the possibilities. At the same time I was given facilities at the Radcliffe Infirmary, Oxford, for the experimental side of the work. In order that all aspects of the subject might be investigated and any question answered the following team of workers was formed: Mr. Vollum, D.Phil., M.A., bacteriologist; K. O. Black, M.D., M.R.C.P., physician; R. G. MacFarlane, M.D., B.S., M.R.C.S., haematologist; Dorothy Russell, M.D., histologist; Mr. Manifold, B.Sc., Ph.D., biochemist; Prof. R. R. Macintosh, D.M., F.R.C.S., anaesthetist. I would like to acknowledge their helpful co-operation.

Description of Apparatus

(a) *Envelopes.*—The envelopes are simple covers designed to envelop any limb. Means of inlet and outlet are provided so that a lesion on any part may be irrigated by the insertion of a glass nozzle through any one of the openings. A simple adhesive seal is fixed on the proximal end of the envelope at the factory, so that by removing the protective gauze a watertight seal is produced by lightly pressing the adhesive to the limb, folding over the excess flaps, and covering with single-sided adhesive bandage. At present the following envelopes are in production:

		Infant	Small Child	Adult
Full leg	Circumference of thigh	Up to 10"	10–14"	14–22"
	Length, groin to heel	,, 15"	15–21"	21–33"
Foot and leg	Circumference (top)	,, 9"	9–13"	12–14"
	Length	,, 14"	14–18"	18–23"
Knee	Length	12"		12"
	Circumference (top)	13–16"		16–20"
	,, (bottom)	10–13"		13–16"
Elbow	Length	16"		16"
	Circumference (top)	8–11"		11–14"
	,, (bottom)	5–8"		8–11"
		Infant	**Large Child**	**Adult**
Full arm	Circumference	Up to 6"	6–11"	11–14"
	Length	,, 13"	13–24"	24–29"
Forearm & hand	Circumference	,, 6"	6–8"	8–13"
	Length	,, 12"	12–17"	17–19"

Envelopes for the head and a full bath are being developed, and will be available when sufficiently tested.

* The word "dissolve" as applied to the removal of dead organic matter is not used in its true chemical sense, but is employed to describe the undoubted washing away of stale exudate and sloughs.

Different shapes and sizes are being tried out, and as the method develops it is hoped to be able to provide a simple means of effectively isolating any part of the body.

(b) *Other Apparatus :*

1. Special trolly for use in hospital.
2. Containers for hypochlorite solution, of glass or vulcanite.
3. Thermometer.
4. Rubber tubing and clips (sterile).
5. Glass cannula and vulcanite roses (sterile).
6. Higginson's syringe (sterile).
7. Waste container (bucket or bowl).
8. Silk sheeting.

(c) *Method of Application of Envelopes.*—See Treatment of Burns.

Technique of Treatment : (i) Preparation of Sodium Hypochlorite

Electrolytic sodium hypochlorite can be made with a small electrolytic cell, as used in modern water purification, producing three pints of 0.6% NaOCl (unstabilized) from 10% NaCl solution in six hours. With a larger plant considerable quantities of NaOCl can be produced as required. However, if this plant is not available, the simplest way to obtain as much sodium hypochlorite as required, in a standardized stabilized solution, was found to be to use "milton" solution, which is 1% NaOCl, standardized and stabilized, and which has been and is being kindly supplied by Messrs. Milton Proprietary Ltd. Since this concentration is a very convenient one for using as a stock solution, it has been decided to refer always to a 1% solution of sodium hypochlorite, electrolytically produced, as E.S.H., so that when we talk of a 5% solution of E.S.H. we mean 1 part of 1% electrolytic sodium hypochlorite to 20 parts of water. This 1% solution of E.S.H. has been used in all my experiments, and appreciation of the assistance given by the manufacturers must be expressed.

Various concentrations of E.S.H. were employed for different purposes. It should be remembered that solutions of E.S.H. above 5% in water are hypertonic, those of 5% almost exactly isotonic, and those below 5% hypotonic. The following guide to the concentration of E.S.H. for various purposes is given.

First, when gross sepsis is present, or dead tissue such as sloughs, scabs, etc., has to be removed, then E.S.H. in strengths up to 50% in water may be used. A concentration of 20% is a good average one. Hypertonic solutions assist the diminution of oedema.

Secondly, when the primary object of thorough cleansing has been attained, and daily irrigation is instituted, to remove stale exudate and to control infection, this daily irrigation should be carried out with a 5% solution. If the skin is very sensitive, or if healing is progressing rapidly, then the concentration may be reduced to 2½%. When there is no infection, or the infection is so slight as to be almost negligible, and stimulation of healing is the main objective, the 1% solution is adequate.

Temperature control is important. The solution should be kept at body heat. It should be made a rule that it be kept at 100° F., except that the initial irrigation done under analgesia or anaesthesia may be carried out at 110° F. Patients are extraordinarily sensitive to slight temperature variations, and great care should be exercised to ensure that the solution is at 100° F. exactly.

(ii) Treatment of Burns

The general treatment of shock, etc., need not be detailed here. It may be mentioned that when a general anaesthetic is necessary for the débridement and dressing of burns it need only be a light one. Various forms of anaesthesia and analgesia have been employed, including intravenous morphine, omnopon, and barbiturates. I have been impressed by the advantages of a vaporizer for delivering warm ether vapour of any desired concentration, devised by the Nuffield Department of Anaesthetics, Oxford: anaesthesia, and even analgesia, have been most satisfactory, and the patients have had no ill effects from their use.

There is much confusion regarding the best method of first-aid treatment for burns, and guidance has hitherto taken the rather negative form of instruction to do nothing. Since some time may elapse before admission to hospital it is felt that the application of packs of E.S.H. to the burn is a considerable advantage—the relief of pain and the practical disinfection, together with prevention of fluid loss, are of great importance. Packs may be applied anywhere quite easily, and cannot possibly do any harm.

First-degree burns may be bathed in 50% E.S.H. for ten minutes, after which the concentration is lowered to 10% for ten minutes. The area is dried and then covered with adhesive plaster. Relief of pain is found to be immediate, and after twenty-four hours there will be little sign left of the burn. Second- and third-degree burns may be classed as either primary or secondary. Primary burns are those that arrive for treatment without having received any attention other than first aid.

It must here be noted that it has been found most difficult to decide at first whether a burn is a bad second or of actual third degree. There can be no doubt that many second-degree burns progress to third degree because of sepsis or trauma, and it is felt that the use of this method will enable treatment to be carried out without the possibility of any harm until the degree of the burn is established. By then any form of treatment may be undertaken without having run the risk of the catastrophes associated with the treatment of deeper burns.

A patient with a second- or third-degree burn is premedicated and anaesthetized as may be necessary, and local treatment is begun. When the blisters are unbroken the area is washed over on the surface with 20% E.S.H. at 100° F. Blisters should then be aspirated with a fine needle and some 10% E.S.H. injected into them. This should be left in for five minutes, and then withdrawn by syringe and needle, and the skin pressed down flat with a dry dressing. When the skin is broken the dead skin should be cut away under a stream of E.S.H., bathed for ten minutes in a 10% solution, and covered with a sheet of the special coated silk sealed at the edges with adhesive.

To deal with large burnt areas a suitable silk envelope, previously sterilized, is fitted. E.S.H. in the strength described is run through the envelope, washing all the affected area. The envelope is drained well and then inflated with oxygen, the inlets being sealed with adhesive tape or rubber-covered clips. Next day the irrigation routine begins: 5% E.S.H. is employed at 100° F., and is run through the envelope over the affected area for twenty minutes. This procedure is carried out three times a day, draining thoroughly for half an hour after the irrigation and then inflating with oxygen. A sheet of coated cotton is placed under the affected part to prevent wetting of the bedclothes, and the tube from the outlet is run into a basin, all this being explained in the directions for applying the envelopes.

In the case of hands the envelope may be filled with E.S.H. for the last ten minutes of irrigation to encourage the patient to move the fingers and wrist. A jet of E.S.H. from a Higginson syringe through the inlet opening may be used to remove sloughs and exudates.

In the case of third-degree burns of the hand and forearm an arm-bath is filled with E.S.H. solution up to a concentration of 20%. The more cleansing that has to be done the stronger should be the concentration. A jet from a Higginson syringe should be employed to scour-irrigate the limb, using the solution in the arm-bath. Dead skin should be removed almost to the margin of the burn. It should not

be removed right up to the edges, to its junction with normal skin, as this may result in subsequent pain. No scrubbing should be employed. Hosing with the Higginson syringe should be continued until spontaneous haemorrhage takes place and the burnt area becomes covered with a firm shiny fibrin coagulum. If profuse bleeding occurs no anxiety need be felt, since it has been found that it will cease spontaneously when the envelope is applied. Definite bleeding-points should be twisted or ligatured. Axillary depilation and nail-cleansing should be carried out.

The burned area is now covered with coated silk sheeting and dried outside this with sterile towels, the envelope being slipped into position over the limb and outside the sheeting. The latter is withdrawn from inside the envelope, the normal skin beneath the seal of the envelope is dried with aether meth., and the seal is closed. A small quantity of E.S.H. (of concentration previously described) is then run over the whole limb, the envelope is drained, oxygen is run in, and the inlets are sealed. Routine thrice-daily irrigation is now maintained for as long as necessary, as previously outlined.

These details apply equally to burns of the legs, but there are certain practical points of importance in addition so far as the legs are concerned. It is convenient to lay the patient on a length of coated cotton sheeting spread out on a table (e.g., an operating table), the sides of the sheeting being raised up by any suitable device. The lower end of the sheeting is formed into a trough leading to a receiver at the foot of the table. The table is slightly tilted to allow the fluid to run into the receiver. The whole of the affected area is then sprayed with E.S.H. of suitable concentration. The whole leg may be enclosed in an envelope, but if this is done care should be taken to see that the foot is thoroughly cleansed. In burns involving the upper thigh pubic depilation is necessary, and should there be no room between the perineum and the burn for the envelope to be sealed, then its use should not be attempted: Burns of this nature need treatment in a "perineal bath," which has proved of great value in the treatment of burns and wounds involving this area. Otherwise, primary third-degree leg burns are treated exactly as those of the hands and arms.

Secondary third-degree burns are those which have been subjected to treatment beyond that of mere first aid and which have failed to heal and have become infected. The technique of their treatment is similar to that of the primary type, but cleansing must be very thorough. When suppuration is present under tan the latter should be dissected away to the healthy margins. Any obviously necrotic subcutaneous tissue should also be removed. The dissection should be carried out under a stream of E.S.H. up to a 20% concentration, and a thorough scour-irrigation should be given for twenty minutes after the removal of the tan. The envelope is then applied and routine thrice-daily irrigation instituted as previously described. Healing usually proceeds rapidly in third-degree burns subjected to this treatment, and at the end of ten days, and sometimes earlier, any areas needing it can safely be skin-grafted.

Where the face and head are burnt, the initial cleansing is done in the normal manner, except that 10% E.S.H. is used. This is sprayed on through a vulcanite rose, with the patient bending his head over a wash-basin or bowl. If a patient cannot leave his bed he lies back with a silk sheet attached around his neck and beneath his head, forming a chute through the head of the bed into a pail. A cylindrical envelope which has slits for his eyes, mouth, and nostrils is then applied. In the two cases treated in this manner the patients have been free from pain, oedema of the eyelids has been reduced very rapidly, and the eyes have shown no signs of any irritation. Where necessary the eyes are washed with 1% E.S.H. solution, after which drops of sterile paraffin are inserted. Immediate skin-grafting may be carried out in many cases or may be deferred for a few days to permit some granulation.

Burns of the limbs may be complicated by the presence of compound fractures. When this is the case it is suggested that treatment might be as described, and plaster or other splinting be applied outside the envelope. In some cases splinting is best fitted (if it is small) inside the envelope.

It has been noticed that most of the burns suffered by small children are extensive and are not capable of being treated in one or other of the limb envelopes. Small vests have been made for covering burns of the upper part of the body, and a nightgown of coated silk with hood has been fitted so that the whole of the child is enclosed, leaving sufficient length from the feet to form a trough over the end of the cot. Children can move freely in this, and are quite comfortable and free from pain. This device is very much in the experimental stage, however, but promises well.

(iii) Grafting

The envelope system of treatment has been successfully employed in the early preparation of an area for grafting. When a denuded area has progressed under treatment sufficiently to be ready for skin-grafting an irrigation is carried out and the envelope immediately removed. The whole area to be grafted is gently wiped over with gauze soaked in 1% E.S.H. Grafting is then carried out in the usual way. The skin-graft may be kept in position by a sheet of perforated coated silk stitched to the surrounding skin; a new envelope may now be applied, and after twenty-four hours have elapsed irrigation once daily with 1% E.S.H. can be resumed. In many cases the skin can be taken from the same limb and both areas healed in the one envelope. The system is not in any way meant to displace skin-grafting. It is left entirely to the surgeon in charge of the case to decide whether he will leave the area to epithelize or whether he will carry out an early graft. In any case, the use of the envelope will ensure the prevention of secondary infection.

(iv) Wounds and Lacerations

I have confined myself to the treatment of burns, but after watching the results of the treatment of various injuries and septic conditions by other workers have felt that the system will open up a new field of work in connexion with the problem of dealing with septic wounds—in fact, with most septic conditions. Various surgeons are using this method in treating septic fingers and infected tendon sheaths, cellulitis, osteomyelitis, varicose and trophic ulcerations, various types of dermatitis—in fact, all surgical cases in which non-traumatic cleansing, prevention of secondary infection, and early restoration of function are important. While the results from the closed-plaster method are excellent, the very fact that expert surgery and proper hospital accommodation are needed for success in this type of treatment prevents its use in most cases on active service, and it is here that the usefulness of the envelope system will be found.

About two hundred cases have now been treated by this method. Detailed below are five illustrative cases.

Case I

A man aged 64 was admitted on January 14, 1941, with phagedaena of the whole of the flexor surface of the left arm. He had grazed a knuckle two days before, and the arm had become painful and swollen. On examination the whole of the flexor surface of the arm had an appearance of one large sanguineous blister, and a vivid erythema was rapidly spreading over the shoulders and on to the face. The patient looked ill. Saline compresses and sulphapyridine were ordered, but without effect.

JOHN BUNYAN: TREATMENT OF BURNS BY THE ENVELOPE METHOD

FIG. 1

FIG. 2

FIG. 3

FIG. 1.—Tar burn, second degree. Slight areas of third degree.

FIG. 2.—After initial washing with 10% E.S.H. Oedema has started to subside; exudation has stopped. No pain. No anaesthetic.

FIG. 3.—After ten days.

FIG. 4.—Arm in full-length envelope: rubber band for use only during irrigation. Employed only as bath (instead of flow irrigation) where movement of injured fingers is required.

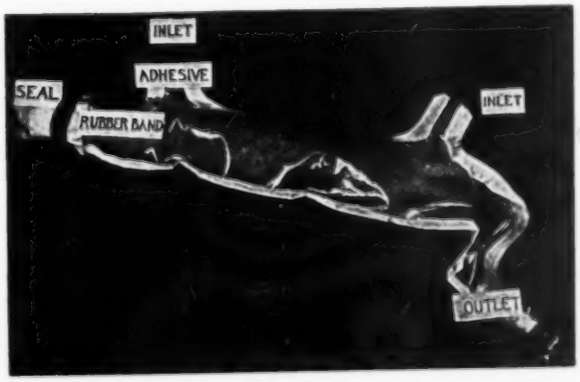

FIG. 4

JOHN BUNYAN: TREATMENT OF BURNS BY THE ENVELOPE METHOD

FIG. 5.—Severe third-degree burns of hands. Initial cleansing with 20% E.S.H.

FIG. 6.—After another month doing full household duties on farm. Absolutely full function.

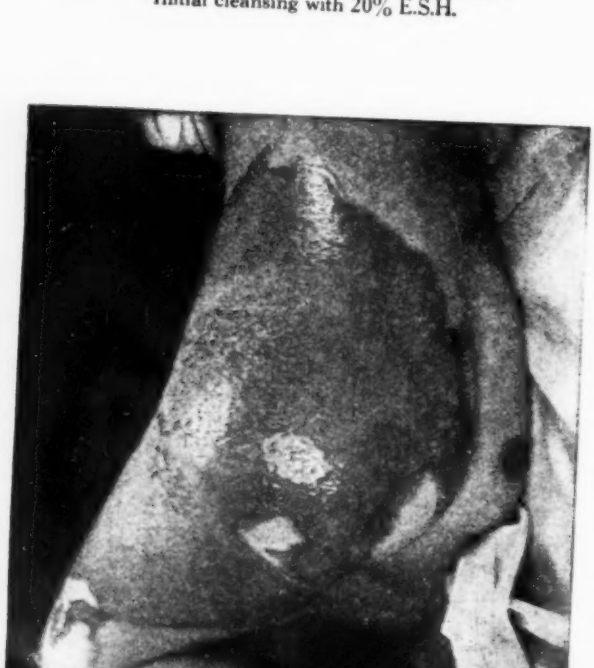

FIG. 7.—Severe third-degree burn of child aged 4. Cleaned with 10% E.S.H. under analgesia. Note fibrin film.

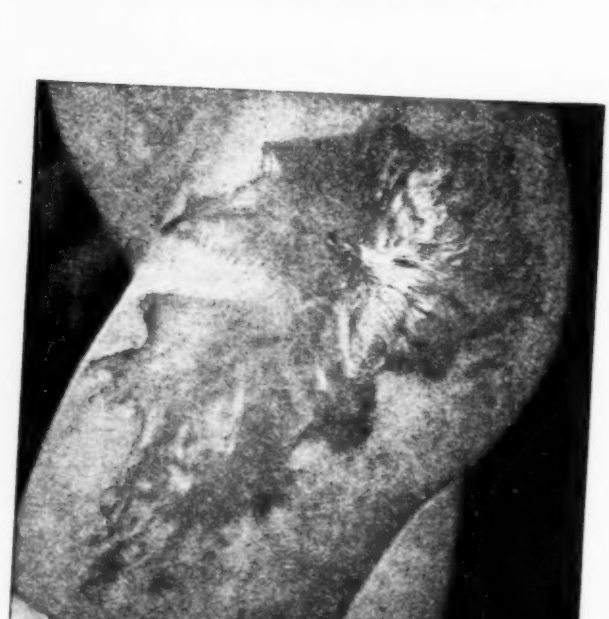

FIG. 8.—Eight weeks later: almost healed; skin very strong and supple. Discharged two days afterwards, completely healed. Full movement of limb.

Photographs by Miss Sally Shaw of Nuffield Photography Department, Radcliffe Infirmary, Oxford (by permission of Dr. A. H. T. Ross-Smith).

I was asked to see the case in the Radcliffe Infirmary, Oxford, by Mr. Abernethy, to whom I am indebted for permission to publish the record. The patient's arm was washed down for half an hour with 50% solution of E.S.H. and the arm fitted with an envelope. From the time of this irrigation the spread of infection was controlled, and within five days the whole of the skin and subcutaneous tissues had come away in one large slough, leaving the muscles and large blood vessels completely exposed. Daily irrigations of 10% E.S.H. were carried out, and in three weeks the whole of the area was covered with healthy bright red granulation. The patient was very well, was completely comfortable, and had almost free movement of his arm. A Thiersch graft was done on March 11 and the arm irrigated with 1% E.S.H. after twenty-four hours. This graft took perfectly. Further grafts were carried out. By March 28 all the skin-grafts had taken and the whole area was healed. The man had full function of his arm, and the new skin was quite supple. He was discharged healed with free function on April 7, and when seen on April 29 the skin was found to be very good, with only slight scarring, but complete function.

Case II

A man aged 25, admitted January 13, 1941, suffering from deep second-degree burns of back and side of hand and wrist, due to petrol on sleeve catching alight. Total area, 105 sq. cm. He was not shocked or in obvious pain, but there was some oedema and stiffness. He had had no previous treatment.

Morphine 1/4 grain was given, and in the theatre the hand was immersed in 12 pints of 10% E.S.H. at 100° F. and washed down for twenty minutes. All loose skin was cut away to periphery of burn. Patient experienced no pain, merely describing sensation as "tingling." A full-arm envelope was then applied. Next day the patient was completely comfortable, and slept well without a sedative. All oedema had disappeared, and a shiny film covered the wound. Thrice-daily irrigations were carried out with 8% E.S.H., and there was extensive epithelization, especially at the wrist. On January 21 a slight irritation was observed at the wrist, and oil was added after the irrigations. On the 26th the hand was cleansed and a new envelope fitted owing to the clouding effect of the oil. All sign of irritation was removed on giving ascorbic acid, 50 mg. thrice daily. By February 9 epithelization was complete, and the hand had perfect function.

At no time had the patient experienced any pain. There was no dermatitis under the seal, and the slight irritation in one part of the arm disappeared on administering 50 mg. of ascorbic acid t.d.s.

Case III

A woman aged 42 discovered in 1938 that she had diabetes. She went into hospital in London and was stabilized on a low starch diet, without insulin. Her urine was free of sugar for two days before she was discharged, but it had never been tested since. Diet worked until evacuation 6 weeks previously, when she began to eat starchy foods occasionally. Her condition became worse, so under protest she came into hospital. During the day her right leg had been badly burned by a hot-water bottle.

She was admitted on March 11, 1941, in semi-coma and was given 50 units insulin subcutaneously and 50 grammes glucose, also 2 pints of water by mouth. The following day she appeared fit and sat up in bed; felt better; given 15 grammes glucose intravenously. Blister burns from hot-water bottle on back of thigh burst, and were dressed with tannafax. On the 21st the burn was in very bad state, and sloughs were forming.

Operation, March 22.—Area of burn from flexor surface of knee extending upwards seven inches; two inches across top and five inches across at knee. The whole skin sloughed away under irrigation with 10 pints 10% E.S.H. at 100° F., and the area began to bleed. There was suppuration into the fat. Edges of wound were ragged. By the time the envelope was fitted haemorrhage had ceased.

Two swabs were taken of burn before irrigation, with the following results. 1 (a), Gram film: numerous pus cells, few Gram-positive cocci. (b) Culture: haemolytic streptococci, *Staph. aureus*, diphtheroids. 2 (a), Gram film: few pus cells, few Gram-positive cocci. (b), Culture: haemolytic streptococci, *Staph. aureus*, diphtheroids. The burned area filled with granulations in seven days, and was completely epithelized in three weeks. The patient was discharged healed, with good skin, on April 30. When seen on May 7 the skin was becoming pinker, and was quite supple and fine. She states that at no time did she experience any pain from the irrigations or any discomfort, either day or night.

Case IV

A man aged 26, admitted January 29, 1941, with petrol burn of palmar surface of wrist and hand, and two small areas on each side of dorsal surface of hand—second degree. Morphine 1/4 grain was given intravenously, and the hand was washed down for twenty minutes with 20% E.S.H., finishing with 10% for eight minutes. All blistered skin was excised. Patient did not complain of any pain, merely remarking that it was "tingling." After five minutes of washing the capillaries dilated and soon burst, but the slight haemorrhage persisted for only five minutes. The whole area became covered with a shiny fibrinous film. A hand envelope was fitted, and was inflated with oxygen.

The next day two washings with 5% E.S.H. were carried out, and the patient was discharged for daily treatment as an out-patient. The hand was irrigated with 5% E.S.H. each day, and epithelization was rapid. On February 10 the envelope was removed, and all areas were found to be covered with a pink cuticle. The hand was quite painless to touch, and full movement was possible. The patient was discharged, to return to work in a few days. He reported on February 20, having been employed as a bricklayer for a week. The epithelium had cornified owing to the hard work, and local and general conditions were excellent.

This case shows that the method may be used successfully in the out-patient department.

Case V

On January 27, 1941, the patient, a woman aged 25, was cleaning the grate, and turned round to tie up one of her children's shoe-laces, when the back of her dress caught fire. She unsuccessfully tried to tear off the dress, thus burning her hands, and then plunged herself into a bath which happened to be full of water. The vicar's wife applied dressings of bicarbonate of soda, and the doctor was called in. At 1 p.m. she was brought into the Radcliffe Infirmary.

Examination showed extensive burns of the second degree from scapulae to sacrum, involving the right buttock; and of both hands, of second and third degree, extending over wrist and lower right forearm. At 1.10 p.m. morphine 1/4 grain was given, and at 2.50 p.m., in the theatre, the burns were irrigated with 10% E.S.H., all blisters and dead skin being removed. The left hand was immersed in 10% E.S.H., and some of the blisters were opened. The patient was encased in a coated silk envelope and the left hand in a hand envelope. She was returned to the ward and placed in a hot-box. At 7 p.m. the right hand was immersed in 10% E.S.H., and at 8.15 p.m. an envelope was applied.

The patient passed a comparatively good night, and next morning cleansing of the hands was attempted in the ward, but the burns proved to be too extensive. At 4.55 p.m. on the 28th blisters were removed in the theatre under gas-and-oxygen. Burns of the palmar surface were partially third degree. Hands were soaked in 10% E.S.H., and the envelopes reapplied. At 8 p.m. 1/3 grain of omnopon was given.

January 29.—Tolerable night. All three envelopes were irrigated with 5% E.S.H. and dried with oxygen.

January 30.—In theatre envelopes were removed. Back was washed with 5% E.S.H., and a new envelope enclosing the trunk and arms was applied. Movement of hands quite good.

January 31.—Envelope irrigated twice with 5% E.S.H. Sulphapyridine given.

February 1.—Patient not so well to-day. Complained of "stinging" on back. Arms irrigated 5% E.S.H. t.i.d. (An experiment was being carried out to determine whether the healing in the envelope method is due to the mere fact of isolating the part from secondary infection and from any irritation, or whether the E.S.H. is associated with the envelope in healing.) Patient's hands are being irrigated in the normal manner thrice daily, but the back is left untouched.

February 5.—Hands and arms irrigated with 5% E.S.H. t.i.d. Movement free.

February 7.—Hands and arms irrigated with 5% E.H.S. t.i.d. Back is covered with thick yellow exudate, which gives off a fetid odour. Where the exudate has run away from the burnt area healing has proceeded rapidly, but where the exudate has collected in the small of the back the granulations are unhealthy and healing is delayed. In the theatre the back was washed with 10% E.S.H. and all exudate removed. The whole was covered with a coated silk sheet.

February 8.—Back much cleaner, but still slightly painful when irrigated with 5%.

February 11.—Back is epithelizing well. Right hand has been removed from the envelope, and has perfect function.

February 13.—Bath given in coated silk. Right hand now quite well.

February 17.—Patient walked to bathroom and lay in E.S.H. bath for twenty-five minutes. Her back is almost healed, and feels "wonderfully comfortable." She is able to lie on the area, and moves quite freely.

February 18.—Patient walked to bathroom for her E.S.H. bath. Both hands are completely healed and have perfect function. There is no pain at all. The back has one small area on the lumbar region which has not healed over.

February 20.—Washings in bathroom are continued. Patient is happy and contented. There is still a small area on the back not healed.

February 28.—Patient discharged with hands perfectly healed, but one small area on the back not yet epithelized. She was given some E.S.H., with instructions how to use it on this small patch.

April 8.—Patient seen as out-patient. She uses her hands for heavy household duties, including the washing of clothes. The new skin on her hands is not shiny or tense, as in the case of treatment under tan, but is supple and allows free movement of all parts of the limb. There are no signs of scarring. Her back is quite healed, but the areas which were slowest in epithelizing are slightly raised. She can bend down and touch her toes quite easily, and is very well.

Clinical Progress

The preliminary irrigation rapidly cleans the whole area of the burn or wound. In many cases there is considerable capillary dilatation and transudation with spontaneous haemorrhage, which stops very quickly with the production of a shining fibrin coagulum; the patient feels little or no pain during the irrigation, and is almost always comfortable afterwards. Soreness may persist for a few hours in some cases of secondary burns. Oedema is often visibly reduced during the washing, and the patient may remark on the loosening up of an affected limb. Excessive exudation tends to cease at the end of the washing. No signs of aggravation of primary shock have been seen. Tissue and bacterial toxaemia are favourably controlled, provided that the burn or wound has been adequately cleansed and all dead material removed. The latter is softened by irrigation, its adequate removal being thereby much eased.

So far as the daily irrigation through the envelope is concerned the patients remain comfortable and can lie on the burnt area with ease. They usually look forward to the irrigation, which they describe as soothing. In most cases temperature and pulse quickly settle and the burn or wound heals rapidly. Movement is encouraged, since it is certain that skin grown on a functioning joint is more likely to withstand use than skin grown on an immobile limb. Patients with burnt hands are made to use them as soon as possible from the time of the application of the envelope. They are encouraged to use a knife and fork and to grasp objects.

The morale of the patients is high and confidence is gained from the start; one never sees the frightened staring appearance so often associated with burns. Some apprehensive patients may describe the irrigation as giving a "tingling" or "pricking" sensation. This is never really unpleasant, and has usually disappeared after the first two irrigations. Secondary burns are more sensitive than primary ones. When epithelization is slow, short-wave therapy may accelerate it.

It has been found that the new skin grown over damaged areas as in third-degree burns is of sound and well-vascularized quality, though perhaps there have not yet been enough cases over a sufficient period of time to form final conclusions on this point.

It has been said before that the primary aim of this treatment is the control of infection. It has never yet been possible to sterilize a wound or the inside of an envelope, but from the clinical signs, and from the fact that the burns heal, it seems that the infection has been adequately controlled. There are some who would even go so far as to say that a sterile wound is probably not desirable. Be that as it may, normal healing has been obtained in ten days by this method, and yet bacteria could be grown in the envelope. It must be said, however, that the numbers of bacteria are very small, and in some cases growth is difficult.

Results of Treatment Analysed

The following are the results of treatment of specific parts of the body.

Hand Burns.—In six cases treated by me relief of pain was immediate. The patients were encouraged to use their hands as much as possible, with the result that in all cases full function, with complete healing, was obtained within three weeks. Second-degree burns were healed, with full function, in ten days. In those cases in which it has been possible to follow up the results it is noteworthy that the new skin is quite free from scarring and is standing up to hard work. There is no sign of contraction.

Burns involving Joints.—Because full function is encouraged and obtained in every case, the new skin is grown to a fully flexed joint and is therefore not stretched at full flexion. Consequently there has been no breakdown of skin on a joint. In one case in which the joints were opened by the burn the hand was healed and is a satisfactory functioning member.

Face Burns.—In the few cases treated oedema of face and eyelids has been reduced completely within twenty-four hours and healing has progressed without interruption. There has been no sign of scarring or of involvement of the eyes or eyelids.

Body Burns.—Various areas of the body have been successfully treated in a vest, a "perineal bath," or a "full casualty bath."

Burns of the Perineum, Buttocks, and Upper Thigh.—The use of the perineal bath has given complete comfort to the patient and made the dressing very much easier than normally in this region. There has been no ascending infection of the urinary tract, and with the exception of one extremely severe burn of a quarter of the body surface, no infection from the urine or faeces. In the one case infection from pyocyaneus occurred, but this was rapidly controlled.

Combined Burns and Fractures.—No case of combined burn and fracture has been treated, but from the experience gained in the treatment of compound fractures by this method it is quite certain that the problem can be solved by applying the necessary splinting outside or inside the envelope, whichever is desired.

Electrical Burns.—Uniformly good results have been obtained in the cases treated, resulting in full function within three weeks.

Chemical Burns.—One case of severe chemical burns has been treated under my direction at a military hospital.

A soldier was accidentally burned by mustard gas on both buttocks, involving the perineum, scrotum, penis, and anus. After ten days I was asked to treat the case. The patient had a thorough washing down with 20% E.S.H., the dead skin was removed, and a perineal bath was fitted. He was irrigated three times daily, and at the end of three weeks was discharged healed, and able to touch his toes without bending his knees.

Dermatitis.—There have been isolated cases of slight irritation of the skin. By changing the envelope and washing it before refitting, by lowering the concentration of the solution, and in one case by the administration of ascorbic acid, the trouble has always cleared up. It is rare to find the slightest irritation beneath the seal.

Chemotherapy.—It would appear that the sulphonamide type of bacteriostatic agent works at its best when dead organic matter is not present. An initial cleansing of the area to be treated with E.S.H. solution enhances the value of these agents. It may be that in a very septic case a

combination of the two types of treatment will be most successful. At present sulphanilamide is being tried out in the envelopes; hypochlorite is used to wash away exudate, and the envelope to prevent secondary infection.

Active Service.—The treating of burns and wounds with an envelope and sodium hypochlorite irrigation was devised as a simple method suitable for use under active service conditions—for example, in field ambulance, dressing station, or in the sick bay of a man-of-war. Its small bulk, its ease of application, and the fact that hypochlorites may be obtained anywhere should make it a most useful addition to modern surgery in warfare.

Conclusions

We feel justified in making claims with some certainty on several points, chief of which are: pain is relieved; primary infection is controlled, secondary infection prevented, and function restored at the earliest possible moment; primary shock is not aggravated, and secondary shock is minimized.

It is a system of treatment which will produce satisfactory results when used in small hospitals without specialist training, in ships, and in fact wherever the simple needs of the system are met. The catastrophes seen heretofore cannot occur when this method is used.

Future developments are in the orthopaedic field, in industrial accidents—in which immediate rehabilitation is so important—and in all branches of war surgery. Numerous varieties of treatment are possible, and many methods which were sound in conception but failed because of secondary infection may now be tried with an envelope, with the assurance that this problem will not arise.

Summary

Investigations into an improved form of dressing for burns and wounds are described.

The reasons for considering electrolytic sodium hypochlorite to be the best antiseptic to use are outlined.

The method of irrigating burns and wounds with this antiseptic, and dressing with coated silk envelopes which do not need daily changing and which shield raw areas from exposure to air and secondary infection, is described.

Burns and wounds covered with coated silk envelopes and irrigated with the appropriate concentration of sodium hypochlorite solution heal rapidly and painlessly, with the maximum preservation of function. The disadvantage of the painful daily changing of dressings is eliminated.

The envelope dressing can be combined with plastering or splinting in cases of fracture, and ulcerations of all kinds may be treated with advantage.

Five of the 200 cases treated by this method are described in detail.

Results are given of the treatment of burns on various parts of the body.

The advantages of this method of dressing for use during active service are emphasized.

I have to acknowledge my gratitude to Surgeon Rear-Admiral Cecil P. G. Wakeley, Mr. Vaughan Hudson, F.R.C.S., Mr. R. V. Hannay, F.R.C.S., Dr. Bruce Pearson, Prof. Hugh Cairns, F.R.C.S., the staff and sisters and nurses of the Radcliffe Infirmary, Oxford, and to all those who have so kindly helped and encouraged me in these investigations. Especially, I have to put on record my appreciation of the way in which Mr. Wm. Stannard has co-operated with me in the development of the envelope system.

M.M. Montgomery and J. D. Kirshbaum (*Arch. intern. Med.*, 1941, **67**, 609) illustrate the rarity of anastomotic jejunal ulcer occurring after gastro-jejunostomy alone or combined with gastric resection by the fact that they could find only eight cases among 13,000 consecutive necropsies performed at the Cook County Hospital from 1929 to 1940. All the patients were white men and their average age was 49. Perforation and haemorrhage were frequent causes of death. The interval between operation for the original peptic ulcer and death varied from six weeks to twenty-one years, the average being eleven and four-tenths years.

WOUNDS AND BURNS TREATED BY COATED SILK FABRIC

A REPORT UPON AND CONCLUSIONS DRAWN FROM THE TREATMENT OF 82 CASES

BY

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On November 6, 1940, Bunyan and Stannard reported a case in which a large infected burn of the thorax and abdomen in a child was successfully treated in an occlusive envelope by immersion in and irrigations with electrolytic sodium hypochlorite. The envelope was manufactured by Stannard, and the electrolytic sodium hypochlorite was the proprietary preparation "milton" fluid, stabilized to 1% of sodium hypochlorite. The method seemed worthy of trial and capable of extension to wounds. Investigation was started in November, 1940, upon two main lines:

1. The use of coated silk fabric as (a) a fashioned dressing in the form of an envelope, and (b) an unfashioned dressing in the form of sheeting.

2. The clinical uses and properties of (a) electrolytic sodium hypochlorite, and (b) the sulphonamide group in conjunction with this special fabric.

In all, 82 cases were chosen because they showed ulceration in some form or another, or ulceration and infection. In a certain number the method was used because all other treatments had failed to relieve pain or to heal the wound, and one was at a loss to know how to proceed. The patients were treated at the Middlesex Hospital and the E.M.S. hospital to which I am attached. Although improvement in technique is continuing to be effected, it is felt that it is not too early to evaluate the results for the benefit of other general surgeons. In addition, there has been obtained a standard that enables us to contrast the quality of other substances. The following is a classification of the 60 cases whose treatment has been completed, 22 further cases being still under treatment:

1. Burns, primary and secondary.
2. Ulcers and gangrene.
3. Severe lacerating wounds, including compound fractures.
4. Acute pyogenic lesions.

Strict attention was paid to the treatment of shock, the use of prophylactic sulphanilamide compounds, surgical toilet, and constitutional and rehabilitation therapy when indicated.

Method of Treatment

In many cases the application of the envelope or sheeting, and in all cases the treatment, have been conducted by the nurses and dressers, who have also taught some of the patients to treat themselves. The envelopes were used as an occlusive or inocclusive dressing. The occlusive dressing was fixed to the intact skin of the patient by means of the seal incorporated in the envelope and reinforced by a light turn of the strapping; the inocclusive dressing by the removal of the seal, and the maintenance of the position by a light turn of the bandage, enabling the envelope to be removed at will for treatment or sterilization. The occlusive method provides the best means yet devised for minimizing the conduction and conveyance of infection, provided that the wound and the inside of the

envelope are kept clean and dry, using a bactericidal or bacteriostatic agent of non-irritant properties. Sheeting was cut to the required shape and used as a pre- and post-operative dressing, or during the operative procedure. As a dressing it was lightly strapped or fixed with mastisol to the intact skin or laid upon the wound and maintained with a minimum of dressings, care being taken to provide a redundancy of fabric, enabling free drainage and tissue "breathing space." In this way it was found of value in primarily sutured wounds, as a covering for raw tender areas, and as a protection of the skin around colostomies and fistulae. In the theatre it was successfully used for "towelling off" operation sites, to protect abdominal swabs, and for the drainage or light packing of large wound cavities—in fact, it was employed wherever bandages and dressings could justifiably be avoided or minimized, and in

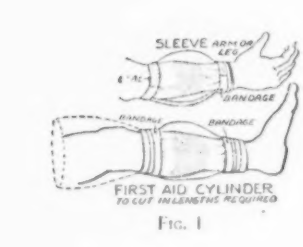

FIG. 1

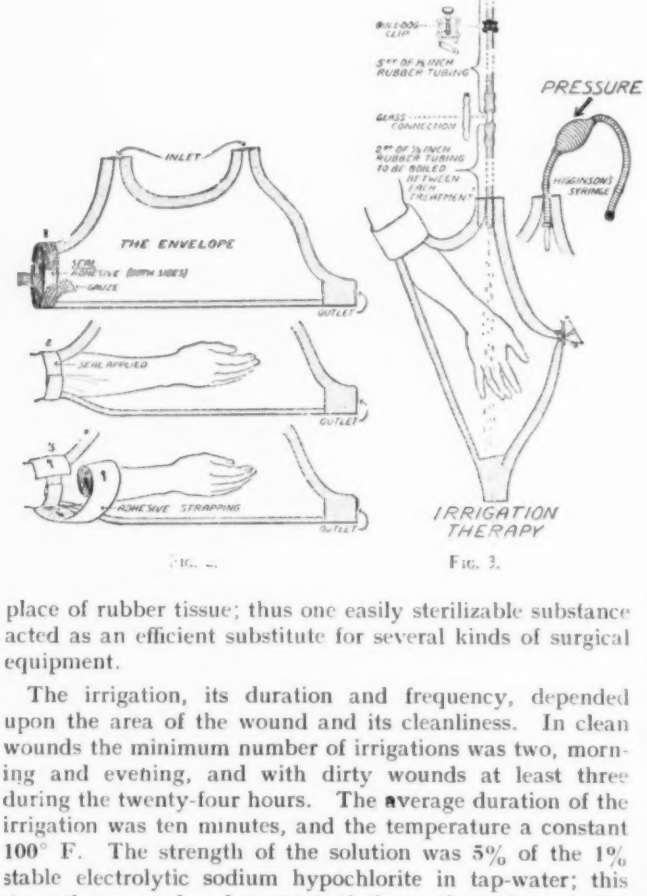

FIG. 2.

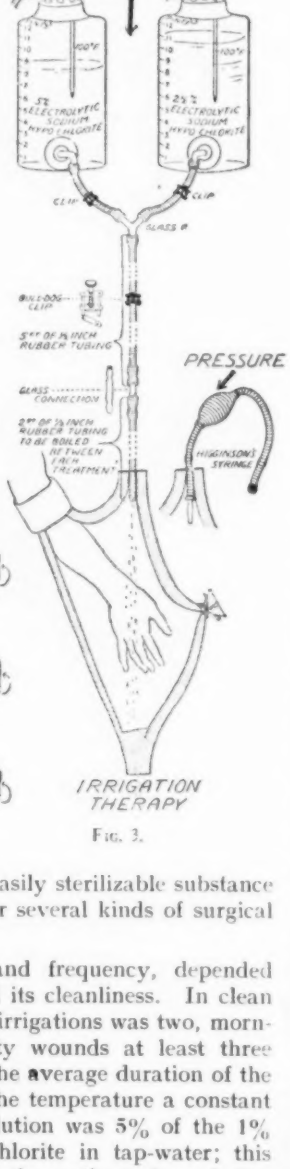

FIG. 3.

place of rubber tissue; thus one easily sterilizable substance acted as an efficient substitute for several kinds of surgical equipment.

The irrigation, its duration and frequency, depended upon the area of the wound and its cleanliness. In clean wounds the minimum number of irrigations was two, morning and evening, and with dirty wounds at least three during the twenty-four hours. The average duration of the irrigation was ten minutes, and the temperature a constant 100° F. The strength of the solution was 5% of the 1% stable electrolytic sodium hypochlorite in tap-water; this strength was reduced to 2½% if the patient showed discomfort or a dermatitis, and as a routine when the wound became clean. The treatment was continued until the wound was healed or ready for primary suture or skin grafting.

In dealing with a number of cases it is essential to provide the nursing staff with suitably large containers, placed at a convenient height on a wagon, or to establish an irrigation room. For a few cases gravity irrigation can be dispensed with and pressure irrigation substituted by means of a Higginson syringe and a tube leading to a suitable container. By these methods the average life of the occlusive envelope was three weeks, and the sheeting lasted many weeks, provided it was washed with soap and water and boiled for the adequate period of two to three minutes only. At the termination of each irrigation the envelope and the wound were dried by postural drainage or suction, oxygen being blown through the envelope to complete the process. The sulphonamide compounds consisted of 20% sulphanilamide or sulphathiazole in a mineral base or as a powder. The employment of these compounds by mouth or parenterally was adopted in all cases in which their use as a prophylactic measure was rendered advisable by the probability of infection. Locally they were introduced in all primarily sutured wounds and applied to certain open wounds. The frequent occurrence of *Staph. aureus* suggested the use of sulphathiazole or a similar compound. Previous work and clinical experience appear to confirm that the efficiency of chemotherapy depends upon free access to normal tissue and to the invading organisms: it does not prevent infection in irregular deep wounds or those containing debris and dead tissue. Its local action is relatively evanescent. A clean wound and frequent reapplication therefore are necessary, and its use was confined to wounds cleansed or kept clean by irrigation. An emulsion or mixture in a mineral base was particularly suitable for the face, where powder imparts a feeling of stiffness and discomfort.

Burns

The total number of cases was 27—primary, 12; secondary, 15. The so-called toxaemia of burns has not occurred; on the contrary, in secondary burns it has been abated.

Primary Burns.—The patient was considered to have a primary burn if he was received within a few hours without having had previous treatment of any duration. Toilet was as gentle as possible, no rough handling or scrubbing being permitted. In certain cases the toilet was by preliminary immersion or irrigation without anaesthesia. Blisters were removed; if they arose subsequently they were dealt with by sterilized scissors through one of the inlets of the envelope. The relief of pain was remarkable, and the average healing time, with full function, was eight to ten days in superficial burns and twenty-one days when focal areas of deeper burns were present. Superficial burns of the face were treated by sulphanilamide or sulphathiazole cream, reapplied morning and evening. If crusts formed they were irrigated away by means of electrolytic sodium hypochlorite before the application of each treatment. A simple face mask was cut from the sheeting and used for the first day or two of the treatment; beyond this the area was left exposed to the air. These results were very satisfactory, pain being slight and cosmesis excellent. The average healing time was six to eight days. Here are two illustrative cases:

Ambulatory Case.—A man aged 38 was admitted on May 11, 1941, with a severe burn of his left hand, which showed large areas of blistering and several areas with complete loss of epithelium. Both dorsal and palmar surfaces were involved, and the burns extended into the web between thumb and index finger and into the webs between the other fingers. The burn was caused when dealing with a burning tarpaulin, the lighted tar from which had dropped on the hand. The blisters were removed and an envelope was applied, irrigations with 5% electrolytic sodium hypochlorite being carried out three times a day. The patient was advised to use his hand, and to put his thumb and fingers through a full range of movement at least once a day. After twenty-four hours he attended as an out-patient for his irrigations. Pain, a prominent feature before irrigations were started, disappeared, and did not return.

After five days the burn was practically healed in its entirety, and the patient's only complaint was that a small puncture had been caused in the envelope while he was unloading some heavy barrels from a brewer's dray! On May 20, nine days after the start of the treatment, the envelope was removed, complete healing having taken place in spite of full work, and the final result is a hand whose function is every bit as good as before the accident.

Air-raid Casualty, complicated by Penetrating Wounds.—A woman aged 29 was admitted during the night in an intense air raid, suffering from severe shock. Blood pressure 80/40. She was unable to speak and semi-comatose, was filthily dirty, and had extensive first-degree and second-degree burns of the whole face, neck, and upper part of the chest, the whole of the right arm and hand, the right leg and thigh, and the left leg. In addition there was a foreign body and an open wound in the left arm and left leg. A plasma drip infusion was given, and after the second bottle the blood pressure was improving and the patient's general condition became more satisfactory. Clothing was carefully removed without disturbing the patient, who was nursed on a bed placed on high blocks. An envelope was applied to the right arm, the right leg, and the left leg. These envelopes were slowly filled with a 10% solution of electrolytic sodium hypochlorite by means of a tube attached to a tap tied into the drainage inlet, the remainder of the inlets being tied off. The face was gently cleaned up and covered lightly with sulphanilamide cream. The left arm was covered with a sterile towel. After half an hour's soaking the filthy residual fluid was drained off by means of a tap and rubber tube introduced into the uppermost inlet drainage site. The envelopes were filled once again with a 10% solution. About four hours after admission the patient was fit enough to be transferred to the theatre, where she was given an anaesthetic—nasal gas-and-oxygen—and pentothal into the drip, which was still running. The metallic foreign body was removed from the left arm; the wound in the left thigh was excised and decompressed, there being extensive muscle damage, but the foreign body proved to be inaccessible. The right arm was left in the original envelope. The right leg envelope was changed without cleaning up the leg; but the left envelope had to be removed in order to enable us to excise the wound, and the limb was replaced in a clean envelope. The left arm, after the removal of the foreign body, was cleaned up and then covered with sulphanilamide cream and bandaged with gauze and wool. In the early hours of the next morning oedema of the face was pronounced and the eyes were completely closed. The patient's general condition slowly improved, but it was not until the fourth post-operative day that her mentality was normal. Throughout the whole period she complained of severe and persistent pain over the left side of her thorax, and on one or two occasions coughed up some black sputum. Although the radiographs of her chest were negative, the physical signs and diagnosis pointed to a localized blast area of the lung. The envelopes were irrigated three times a day with 5% electrolytic sodium hypochlorite, and after a light toilet the sulphanilamide cream was changed twice daily, the face and chest being covered by a mask of coated silk; this mask was replaced by a clean sterilized "fellow" at each change of the dressing. About the sixth day she complained of discomfort in the left arm. The bandages and gauze were removed, and it was found that her discomfort was mainly due to the fact that the dressing had become adherent to the multiple sites of the burn. This dressing was replaced by sulphanilamide cream and a coated silk sheeting, lightly bandaged in position, without any gauze and wool. Thereafter she was quite comfortable. It was noteworthy that this arm was swollen and oedematous until the dressing had been changed; but, on the other hand, the oedema of the face had completely resolved by the fourth morning, and at that time there was no oedema of the limbs treated in the envelopes. Throughout the period, movement of the limbs in the envelopes was free and painless, and the patient required only one dose of morphine. The temperature never rose above 99° for the first three days and subsequently was normal. Twenty days after admission all wounds and burns had healed and full function was present. It must be stated that, although the parts injured were very extensive, there were multiple localized areas under the extremities, but the face, neck, and chest consisted of one large superficial burn. With the exception of a few focal points the burns could be described as of first and second degree. As is usual, up to the third and fourth day blisters tended to make their appearance, and were removed, without interfering with the envelopes, through a convenient inlet hole made with sterilized scissors. Two wounds, which necessitated wide surgical exposure down to the bone, healed by primary union. So far the cosmetic appearance is excellent.

Secondary Burns.—Patients admitted some days or weeks after receipt of the burn were regarded as secondary cases, the burn being complicated by infective ulceration. These were cases in which the use of tannic acid, sulphanilamide and tulle gras, saline dressings and flavine dressings, among other treatments, met with failure. All were heavily infected, usually with the triad *Str. haemolyticus*, *Staph. aureus*, and *B. coli*, and suffered from pain and toxaemia. Either with or without an anaesthetic, according to the condition of the patient, initial treatment with a long irrigation of 5%, increasing to 10%, was used to clean up the wound and remove debris and pus. A suitable envelope was applied and irrigation treatment given. The length of time taken to clean up the wound was a matter of a few days only, and it was interesting to note that during treatment intact islets of epithelium began to appear, as survivals of the original burn and the infective ulceration caused by the previous treatment. The average length of time taken to heal the wound depended on the area and whether grafting was employed or not. The following are two illustrative cases:

A woman aged 20 was treated as an out-patient in a casualty department which had achieved success in minor superficial burns by the use of sulphanilamide cream and tulle gras. She had a large superficial burn complicated by an unsuspected deep burn. Ten days after her injury she was admitted with pyrexia, pain, oedema, and infection originating in the coagulated debris of the deep burn, 4½ in. by 3 in., on the extensor surface of the forearm. A rapid relief of symptoms was obtained by the use of the envelope and irrigations. Healing took place in forty-two days. Skin grafting could have been employed at an earlier date, and would have considerably shortened her convalescence. It should be noted that sulphanilamide did not prevent the area of necrosed tissue from becoming infected.

A man aged 73 was admitted three weeks after a fall into a fire. He was ill, pyrexial, and had a cough and bronchitis. The burnt area extended over half the dorsum of the thorax and the whole of the upper arm, reaching below the elbow-joint. This was covered by a suppurating mass of tannic acid and silver nitrate coagulum, containing *Staph. aureus*, coliform bacilli, and diphtheroid organisms. Suitable sheets of coated silk fabric were used as a dressing and to protect the bed during irrigations. Irrigations were started three times a day with 5% electrolytic sodium hypochlorite. After each irrigation sheets of coated silk fabric were laid over the raw area. The improvement in the general condition and the relief from pain were remarkable. In two days the whole of the coagulum and slough had been irrigated away. Five days after beginning treatment a "vest envelope" was fitted. The patient lay or slept on his back and needed only a ward jacket over the vest when sitting up in bed or in a chair. Gradual healing proceeded; the vest was removed and tulle gras and sulphanilamide dressing were instituted. In five days lysis of a considerable area of new epithelium had occurred. A new vest was fitted, and again epithelization proceeded apace. It is now seventeen weeks since the beginning of treatment, and only two small areas remain to be healed. The age of the patient and the bronchitis precluded saline bath treatment; but the bath, in the shape of a vest, was most successfully brought to the patient, permitting painless treatment and ambulation, and resulting in spontaneous healing of a vast area. Had the patient been younger, skin grafting, done at an earlier stage, would have shortened treatment and obviated a degree of contracture at the elbow-joint and posterior axillary fold.

Ulcers and Gangrene

The total number of cases was twenty-six. These consisted of 14 varicose ulcers, 5 traumatic ulcers, 2 varicose ulcers and syphilis, 1 chronic infected olecranon bursitis, 1 radio necrotic ulcer, 1 Meleney's ulcer, 2 Buerger's disease.

With the exception of the Meleney's ulcer, which was unaffected by treatment, all were benefited. Surprisingly, a tabetic patient with a perforated ulcer of the foot, uncomplicated by an osseous lesion but complicated by cellulitis, was healed in three weeks. The 2 cases of Buerger's disease were treated as a preliminary to surgery. The 14 cases of varicose ulcer are worthy of mention. They consisted of patients admitted for ligation and injection

treatment, and formed a group which had had every known method of treatment, the envelope being used as the sole remaining measure. These patients certainly were kept from their work, but particular attention was not paid to resting them in bed. They were allowed to get up and sit or walk in the ward. In those cases in which the bacteriology was investigated the usual organisms were again the triad *Str. haemolyticus*, *Staph. aureus*, and *B. coli*. These ulcers are notorious for their tendency to break down again even after firm healing, and this may occur in our cases; but the rapid freedom from pain and the sound though slow healing of the ulcers made the treatment worth while. The following is a representative case:

A woman aged 88 had for thirteen years suffered severe pain and disability from a varicose ulcer, 1 in. by 1 in., situated immediately above the right external malleolus of the fibula. It was completely resistant to all previous forms of treatment. A fixed talipes equinus deformity was present, due to this ulcer. She was admitted, was fitted with an occlusive envelope, and was given irrigations of 5% electrolytic sodium hypochlorite thrice daily; these were later reduced to 2½% twice daily. In three weeks the ulcer was soundly healed. The train and bus fares to the out-patient department, the dressings, remedies, and medicines had cost her, and hospitals, many pounds a year.

Severe Lacerating Wounds, including Compound Fractures

The total number of cases was 15: 10 severe lacerating wounds, 5 compound fractures.

In primary clean cases with loss of substance the wound after surgical toilet was treated in an occlusive envelope, resulting in return of function and avoidance of infection. In certain cases of mutilating injuries with ingrained oil and dirt, amputation was avoided and some function preserved by this method. In infected compound fractures with loss of substance, deodorization and practical disinfection, with healing and union, were brought about. Where traction was necessary the apparatus was placed either inside or outside the envelope. If traction apparatus is placed within the envelope the pins or wires must be of stainless steel or "staybrite," as the great disadvantage of sodium hypochlorite is the destructive action upon unprotected silk and metals.

A man aged 67 was admitted two months after sustaining a compound fracture of the mid-shaft of tibia and fibula, treated by unpadded plaster casts with light packing of the wound and a Steinmann pin through the os calcis. The patient was ill and pyrexial, the plaster dripping pus containing *Str. haemolyticus*—a menace to other patients and medical personnel. The odour was indescribable. Under light anaesthesia the plaster was removed and cultures taken, revealing haemolytic streptococci. The leg was flail at the fracture and up to the knee-joint it was covered with superficial ulcers and pus, the ivory-white dead ends of the tibia protruded through a large ventral ulcer, and posteriorly a large ulcer led to the fibular fragment. The whole area was irrigated for twenty minutes with 10% electrolytic sodium hypochlorite, a sleeve envelope fitted with a ventral opening for irrigation and a dorsal for drainage, and the patient put up in a Hodgen splint. The odour disappeared immediately; comfort was established and treatment was rendered easy. Three times daily the wound was irrigated. The posterior ulcer healed quickly, and the ventral ulcer healed save for an area of one square centimetre where a portion of the tibia is sequestrating. The extension has been removed as union is starting, and is firm enough to permit a light Cramer wire padded splint, enabling the patient to sit in a chair. It is now eleven weeks since treatment was begun.

Acute Pyogenic Lesions

The total number of cases was 14: 8 were infections of the hand, 2 cellulitis of limbs, 2 bursitis, and 2 Brodie's abscess of bone.

The cure of suppuration of the hands and fingers, the legs and feet, has long been a matter of difficulty; consequently we made a trial of the envelope method in the treatment of this condition. The results were determined entirely according to whether free drainage had been instituted and every pocket opened up at the time of the surgical procedure. Provided this had been done, the results were good—better than those of the old-fashioned saline baths or fomentations, as maceration and oedema did not occur. If the drainage provided was not adequate the slight drying action of the electrolytic sodium hypochlorite tended to heal and close the superficial edge of the wound, enabling pockets of pus to collect, necessitating further drainage. Careful watch must be maintained to ensure free drainage and adequate irrigation or immersion, the envelope being removed if pain and oedema are not abating and the area thoroughly examined.

A man aged 31 was admitted six days after a small cut with a knife. There was a suppurative tenosynovitis of the middle finger of the left hand and lumbrical spaces. Under anaesthesia surgical drainage was instituted. The organism cultured was *Str. haemolyticus*. An envelope was fitted in the theatre, and irrigations were given thrice daily with 5% electrolytic sodium hypochlorite. Fourteen days later a small residual abscess in a lumbrical space was opened; healing and return of function proceeded. The wound had healed five weeks after operation, but function is limited, though improving.

In the acute stages of infection chemotherapy was not neglected and the greatest care was exercised in starting movement. Movements that the patient could voluntarily perform were permitted, but only when drainage was perfect and the signs and symptoms of acute infection had subsided. Too early an attempt at rehabilitation may lead to disastrous invasion of organisms, locally and into the blood stream.

Pain

Irrigation can be made painful if exposed nerve endings are traumatized by the force of the stream. The wound must be watched, and the fluid should be allowed to run over a sensitive area and not directed upon sensitive focal points. The abolition of pain is the function of medicine and the patient's criterion of successful treatment. The relief of pain from the use of this method has been remarkable, and has helped in the reconstitution and rehabilitation of the patient.

A woman aged 29 was suffering from a residual deep burn of a large area over the left ankle-joint of two months' duration, with persistent infection due to a combination of tannic acid and plaster treatment. All methods, including saline, tulle gras, and chemotherapy, had failed. Persistent pain necessitated sedatives. Spasm of the whole limb-girdle was present, with consequent slight movement of the hip-joint, less at the knee-joint, and absence at the ankle-joint. An envelope was applied eight weeks after the injury and irrigations with electrolytic sodium hypochlorite begun. After forty-eight hours spasm of the limb-girdle had disappeared. No sedatives were required. In eight weeks the area was healed, with full function of the ankle-joint. During treatment the patient became ambulatory, regularly visiting the cinema wearing the envelope.

Function and Rehabilitation

The importance of early rehabilitation of the patient cannot be over-emphasized. Below are three cases which illustrate this point.

Ten days after a resection of bone for a chronic staphylococcal Brodie's abscess of the upper end of the humerus in a youth aged 17, the vaselined pack was irrigated away with 10% electrolytic sodium hypochlorite under evipan anaesthesia and an envelope was fitted to the shoulder-girdle. The patient was permitted full movement, and to be up fully dressed, wearing his clothes over the envelope. He shopped and visited the cinema in his usual attire.

A man aged 55 had severe pain due to an irregular varicose ulcer situated over the external malleolus of the left foot; this was resistant to all forms of out-patient treatment over a period of six years. He was unwilling to come into hospital, but lived near enough to undergo ambulatory treatment. An envelope was applied, and he voluntarily attended the irrigation room three times daily as an out-patient, and continued to do

so because, twenty-four hours after the first treatment, his pain had been relieved. He was taught by the nursing staff to administer his own treatment, and attended until, in sixteen days, the ulcer was completely healed.

A woman aged 41 sustained a severe penetrating wound of the left leg from a bomb splinter. The injury involved all compartments of the mid-lower leg, ruptured the anterior tibial artery and interosseous membrane, and caused extensive loss of tissue. The dead and dying tissue was removed and the area extensively decompressed, powdered with sulphanilamide, and packed lightly with vaselined gauze. The limb was then placed in a padded plaster stretching from the toes to the groin. In three weeks, under light anaesthesia, the plaster was removed and the packing irrigated from the gaping wound with 10% electrolytic sodium hypochlorite. The limb was placed in an envelope and irrigations were continued three times a day. Voluntary movements were gradually encouraged and the patient eventually became ambulant. The wound healed in six weeks, with full function of the limb.

Conclusions

The coated silk fabric is a valuable addition to the armamentarium of the surgeon. Its value as a dressing, whether by the occlusive or the unocclusive method, has been proved. Sodium hypochlorite prepared by electrolysis and stabilized has been of pronounced value in this treatment, enabling wounds to be kept clean and dirty wounds to be made clean, with the relief of pain and oedema, and early rehabilitation. As an adjunct to this treatment, the sulphonamide group has been of great service in oral, parenteral, and local therapy. The common factor in successful treatment depends upon the adoption of general surgical principles—the prevention and control of infection, the removal of dead tissue, and the provision of free drainage with the minimum disturbance of tissue. Provided that cases are wisely chosen, rehabilitation and healing can occur simultaneously in clean open wounds in spite of the employment of full movement. The illustrative cases suggest that a full trial should be made of the coated silk fabric under Service, civilian, and factory conditions—as a first-aid measure and as a method of treatment in burns and wounds of minor and major degree.

First Aid.—In extensive injuries the application of a full-length envelope will conserve body heat and lessen shock. A full-length envelope, a local envelope, or sheeting will provide a light, transparent, non-frictional dressing which will diminish pain, permit free drainage, and facilitate inspection and handling without disturbance of the wounds. In first-aid stations or casualty posts remote from a surgical centre, and at the surgical centre during the waiting and resuscitation period, immediate general and local control of infection can be carried out. In the absence of electrolytic sodium hypochlorite, powdering the wound with sulphathiazole may be advocated. During this waiting period before and during transit anti-shock measures should be continued and the blankets and clothing occasionally lifted for the rapid examination of the wound. If oozing is troublesome a firm bandage may be applied outside the envelope to obtain pressure on the wound. Where there is considerable delay in transport, or at the surgical centre, immersion or irrigation therapy may be employed, and be combined with chemotherapy. In the absence of these facilities the repowdering of the wound every twelve hours is suggested. Casualties so dressed on arrival at the surgical centre can be inspected and treated with the minimum disturbance. In gas-contaminated wounded lavage will be facilitated, and with sodium hypochlorite available a direct action upon mustard gas can be obtained. In the wards a ready detection of the earliest appearance of delayed burns will be rendered more certain.

At the Surgical Centre.—The selection of cases regarded as suitable for treatment by these methods may be considered under the headings of primary and secondary methods.

Primary Method: 1. By Irrigation:

(A) Burns whose depth is in doubt, or surgical toilet perforce imperfect. Deep burns unsuitable for primary excision. Burns complicated by penetrating wounds.

(B) Open clean wounds after adequate surgical toilet. Mutilating wounds in which precise surgical toilet is prevented by the ingraining of oil or dirt. Compound fractures with loss of substance, or in which delay in arrival renders primary suture unwise—provided that skeletal or skin traction, or splinting, can efficiently control the fracture.

(C) The burns, wounds, and compound fractures of the gas-contaminated.

2. By 20% sulphathiazole emulsion or cream:

In superficial burns of the face and as a cream or powder for superficial wounds or burns elsewhere. The surface to be kept clean, soft, and exposed, but the dressings performed daily.

Secondary Method: 1. By Irrigation.

(A) Secondarily infected burns. Delayed mustard gas burns.

(B) Wounds in which immobilization by plaster had been necessary, but in which the lapse of time has enabled the acute symptoms to subside and made the establishment of movement safe.

(C) Secondarily infected primarily sutured wounds, including compound fractures, as a complement to adequate surgical drainage.

(D) Certain cases of acute infection involving soft, bursal, or synovial tissues.

(E) Chronic, traumatic, infective, or varicose ulceration, resistant to treatment by other methods, or as a complement to recognized surgical procedure.

2. By sulphathiazole powder or cream.—To clean healing wounds as a final dressing.

Points that Must be Emphasized:

Movement is only to be encouraged when the wound is clean and acute symptoms are absent.

Free ventilation and redundancy of fabric in the neighbourhood of the wound are essential. Close apposition and superimposed dressings or excess of clothing are to be avoided. The only exception is the deliberate intention of keeping the wound warm and moist.

Strict attention must be paid to the avoidance of conduction and conveyance of infection. Inefficient surgical nursing ritual is the cause of the contaminant organisms arising in the wound and envelope during treatment.

A bactericidal or bacteriostatic agent must be applied, and frequently reapplied, to prevent gross infection and reduce the bacterial count. Without antiseptic methods the coated silk fabric may conceivably encourage growth of organisms.

Catgut (not silk), stainless steel, and "staybrite" (not unprotected metals) should be used when sodium hypochlorite is the irrigation fluid.

The method increases the possibility of the early replacement of skin loss by skin grafting, and this grafting should not be unduly delayed and should be accompanied by sulphonamide therapy.

The average strength of the irrigation fluids used is 5% or 2½% of a 1% stable sodium hypochlorite. Hospitals, ships, and factories having their own plant for the electrolysis of brine should check the percentage of sodium hypochlorite obtained and carefully adjust the percentage dilution of irrigation fluid before use, in order to avoid too strong or too weak a solution.

The treatment needs care and thought. It is not a competitor or a universal panacea, but it has a definite place in surgical treatment.

The average life of the envelope in use is three weeks and of the sheeting used as a dressing many weeks. A considerable economy in bandages and dressings can be effected. Patients have not been averse to seeing their own wounds, but, on the contrary, have been interested and encouraged by their progress. The visibility of the wound has enabled the medical staff and nurses to observe the pathology and physiology of living tissue.

Summary

Twenty-seven cases of burns and 55 of wounds have been successfully dressed with a coated silk fabric, in conjunction with treatment by sodium hypochlorite, prepared electrolytically and stabilized, and the sulphonamide group of chemothera-

peutic agents: twenty-two of them are nearing the end of their treatment. The methods employed and illustrative cases are recorded. The tabulated conclusions provide a basis for an extended trial of these methods as a first-aid measure in the prevention of shock and the control of infection and as a method of treatment in selected cases. The possibility of replacing dressings and rubber tissue by one portable and easily sterilizable substance is suggested. Stress is laid on the necessity and facility for early painless rehabilitation of the wounded.

My most grateful thanks are due to Mr. Rodney Smith, Mr. H. M. Darlow, and many members of the nursing staff and students of the Middlesex Hospital; to the Board of the Middlesex Hospital for facilities afforded to me and my two commandants, Mr. B. W. Windeyer and Dr. Breeze; to Lieut.-Commander Bunyan, Mr. Bruce Pearson, and Mr. Haanay, for their association and help and for allowing me to see their cases; to Dr. Maurice and Dr. Chiesman for their co-operation; to Prof. McIntosh and Dr. Britton of the Bland-Sutton Institute of Pathology, Middlesex Hospital; to Mr. Stannard for his advice and generosity in the supply of envelopes for these research purposes; to the Milton Proprietary, Ltd.; and to Messrs. May and Baker for their supply of materials.

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THE VALUE OF THE NON-SPECIFIC FACTOR IN EXPERIMENTAL IMMUNIZATION WITH INFLUENZA VIRUS

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Influenza is one of the few virus diseases which do not induce in the patient after recovery any manifest immunity, although during and after convalescence virucidal antibodies can be detected in the serum. After a few months have elapsed a second attack may be experienced. As there is only a transitory immunity after recovery from the illness, the possibility of acquiring more prolonged immunity by artificial immunization is very limited.

So far laboratory experiments on ferrets and mice show that it is possible to immunize these animals for a period of about three months only if the virus is applied intranasally. If at the end of that time the virus is injected subcutaneously, immunity can be prolonged over a further period, as shown by the resistance of the ferrets to reinfection by the nasal route (Laidlaw and others, 1935). The only positive effect in the immunization of ferrets and mice by routes other than nasal is an increased resistance in the immunized animals to lung lesions caused by the subsequent application of influenza virus; this may be due to the presence of protective antibodies induced by the previous injection of the virus.

In the blood of immunized animals and in human beings after recovery there can be demonstrated virucidal, precipitating, and complement-fixing antibodies (Magill and Francis, 1938, Hare, 1939; Fairbrother and Martin, 1939; Eaton and Beck, 1940), but their immunizing effect, as demonstrated by insufficient subsequent protection against reinfection, is disappointing in most cases. One possible explanation of this inadequacy is the fact that there are several types of influenza virus; but, on the other hand, these are antigenically very close, as they give a cross-complement-fixation with each other.

Unfavourable reports on the immunization of human beings with the vaccines at present available have been published in this country and in the U.S.A. (Dochez, Mills, and Kneeland, 1938; Powell, Sparks, and Clowes, 1940; Stuart-Harris, Smith, and Andrewes, 1940; and others). The new combined influenza and distemper virus vaccine introduced by Horsfall and Lennette (1940a, 1940b) seems to be promising, but results are not yet available.

As the usual influenza virus suspensions do not give satisfactory (that is, only transitory) results when applied by routes other than the nasal, we tried to increase specific immunity by adding to the specific stimulus an unspecific factor which would activate the reticulo-endothelial system, or act by simultaneous local irritation of the tissues. This method is often successfully applied in immunization against bacteria and their toxins, and therefore a trial in the case of the influenza virus was logical.

The following experiments were carried out:

Experiment 1

Groups of 50 mice from one stock were given subcutaneous injections of 0.25 c.cm., 0.25 c.cm., and 0.5 c.cm. at weekly intervals of the following three preparations:

(a) A vaccine containing per c.cm.:

B. pneumoniae (Friedländer)	25 millions
M. catarrhalis	25 ,,
Pneumococcus	150 ,,
Streptococcus	150 ,,
Staphylococcus	100 ,,
C. coryzae	25 ,,
H. influenzae	100 ,,

Preservative, 0.5% phenol

(b) A vaccine containing per c.cm.:

Sarcina	3 millions
B. mycoides	2 ,,
Pneumococcus	1 million
Streptococcus	1 ,,
Mixed lipoids (cod-liver oil, 0.02 mg.; cholesterol, 0.67 mg.; lecithin, 0.1 mg.)	0.187 mg.

Preservative, 0.5% phenol

(c) Saline containing 0.5% phenol

Three weeks after the last injection the mice received 0.05 c.cm. of a suspension of influenza virus Type A prepared as follows:

Lungs were removed from mice which had been infected with the virus five days earlier. The lungs were weighed moist, pulped in a mortar, and taken up in broth in the proportion of 2.25 grammes to 10 c.cm. This suspension was centrifuged and filtered through a small Berkefeld candle. The filtrate showed high activity of the virus, as mice were killed by intranasal instillation of dilutions of 1 in 1,000. The injections were made intranasally under chloroform - ether anaesthesia. Ten normal mice were similarly injected at the same time to serve as additional controls.

The results from the three preparations were: (a) 6% survivals, (b) 12%, (c) 11%. Survivals from the controls amounted to 20%.

Experiment 2

A suspension of influenza virus prepared as described above, except that saline was used instead of broth, was incorporated in the following preparations:

(d) A mixture of preparation (a), 2 parts; mixed lipoids as in (b), 1 part; influenza virus, 1 part
(e) Mixed lipoids, 3 parts; influenza virus, 1 part
(f) Colloidal calcium, 3 parts; influenza virus, 1 part
(g) Saline, 3 parts; influenza virus, 1 part

0.1% formalin was added to all the mixtures, and they were kept in the refrigerator pending animal experiments.

Groups of 24 mice were given subcutaneous injections of 0.25 c.cm., 0.25 c.cm., and 0.5 c.cm. at weekly intervals. One week after the third injection they received 0.05 c.cm. of a suspension of influenza virus intranasally under chloroform - ether anaesthesia.

The results from the four preparations were: (d) 87% survivals, (e) 96%, (f) 79%, (g) 88%.

Conclusions

From the above experiments it is evident that the immunization of mice against bacteria associated with cold infection has no protective effect against subsequent infection with influenza virus. Mice immunized either with a cold vaccine or with a polyvalent antigen show the same

percentage of deaths as the mice injected with phenolized saline.

Having excluded the possibility of the production of non-specific immunity by bacteria, we found in the second experiment that there was no substantial difference between the resistance of animals in the four groups to subsequent infection with influenza virus.

These experiments indicate that the simultaneous application of heterogeneous substances had no influence on the production of immunity against influenza virus.

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THE CONTROL OF GASTRIC HYPERACIDITY IN PEPTIC ULCER

BY

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In spite of all attempts to discover the aetiology of chronic peptic ulcer it must be admitted that the essential cause still eludes us. Analysis of the gastric juice frequently shows a high acidity, less commonly a moderate or low one, but a total absence of hydrochloric acid is quite unknown in this condition. While we have often concluded that hyperacidity is a cause of gastric ulcer, we have no evidence in favour of this at all. There is more evidence that the presence of HCl tends to continue the activity of an ulcer, once it has formed, and that healing is prevented. For this reason, chiefly, our main attempts at therapy in peptic ulcer have hitherto centred on the continuous neutralization of HCl by diet, drugs, and other methods. Quite probably the acid factor is not the sole cause of an ulcer's not healing, but at present the neutralization of HCl is our main therapeutic weapon. Furthermore, it is already clear that ulcers do heal even when HCl is present in the stomach during part of each day.

Diet as a means of neutralization of acid takes first place, and is given at hourly or at most two-hourly intervals; but it is already known that this cannot bring about continuous neutralization, and, moreover, during the hours of sleep feeding is impossible. Numerous drugs (alkalis and others) have therefore been used, but they are in many ways unsatisfactory. We want to find, if possible, foods or simple drugs that will ensure continuous neutralization throughout the twenty-four hours, or will keep the secretion of HCl permanently as low as possible.

The series of experiments now to be described were undertaken with a view to discovering the most suitable foods or simple drugs to maintain neutralization for as long as possible during the twenty-four hours. The substances under investigation were given two-hourly, and the stomach contents in all cases were examined repeatedly during a continuous period of twelve hours, the Ryle tube being kept in position; samples were removed for hourly examination shortly before and one hour after feeds. All patients included in this investigation presented clinical and radiological evidence of peptic ulcer, and fractional test meals were first given in the usual way, with oatmeal gruel as the stimulant of gastric juice. Every test showed hyperacidity, and the curves obtained over two and a half hours were in general similar to those described by Ryle (1921).

Methods of Titration

The amounts of fasting juice and residue were measured, and all specimens were titrated for free and total acidities with decinormal sodium hydroxide, using methyl orange and phenolphthalein as indicators respectively. Results are expressed as units in terms of c.cm. N/10 NaOH required to neutralize 100 c.cm. of fluid. Only the free-acid readings are here recorded.

Group I (9 Cases)

For purposes of comparison feeds of milk, 10 oz. by mouth, were used in each case before other treatment. Parallel experiments with whole milk and citrated milk indicated no appreciable difference between the two in the resultant acid level, and as the thick clots of whole milk were found to block the tube the work was continued with citrated milk, to which alone results refer. Considering the great importance attached to milk in the treatment of peptic ulcer, one would expect to find that it caused a substantial reduction of acidity. But Nicol (1939) could not demonstrate this either by two-hourly or by hourly feeds: indeed, he recorded a higher acidity with milk two-hourly than with a diet consisting of three full meals. By quarter-hour readings he showed that a fall occurred immediately following each feed, but only of short duration: before the next feeding-time the level had risen to its previous height. The results of the present experiments are in complete agreement with those of Nicol. Surprisingly high levels were obtained: it was common to find figures of total acidity of 70 to 80 units, and few were below 30. The charts, with hourly readings, did not show the fluctuations indicated by Nicol, but the reference is the same—namely, that milk given at two-hourly intervals has little if any continuous antacid value.

Gelatin (feeds of 10 oz.) was next used, prepared according to the method of La Due (1939)—gelatin 1 part, lactose 3, water 32 parts. Andresen (1927, 1939) used this mixture with success in the treatment of haematemesis. I had already tried it as a secretory stimulus in the fractional test meals of 7 patients and had compared the results with those of gruel meals in the same cases. Apart from the fact that gelatin specimens were homogeneous and easier to titrate, no significant differences were noted in the acid curves; similarly, in the twelve-hour tests gelatin appeared to have approximately the same neutralizing power as milk, although the former is supposed to be a powerful stimulant of gastric juice.

The rational use of olive oil in the treatment of peptic ulcer is demonstrated in this series; both olive oil and peach-kernel oil were found to cause a substantial reduction of acidity, an effect already reported by Roberts (1931). In 4 cases three feeds of milk (10 oz.) were given two-hourly followed by three of oil (2 oz.) two-hourly; and in the second half of each test there occurred a fall of 20 to 60 units. The experiments were repeated several times in the reverse order, and a similar depression with oil was followed by a rise to over 40 units under the influence of milk. Chart I represents such curves, obtained from one patient. Peach-kernel oil and an emulsion of olive oil, as will be observed from Table I, are not quite so effective as undiluted olive oil. A criticism was offered that the low acid values were due to the nauseating taste of oil; but this was disproved by the fact that when oil was syringed down the Ryle tube the values were even lower than when it was given orally.

As a deliberate contrast tests were made with two substances which are supposed to be strongly acid-producing—bovril and strained meat stock. The latter has always been excluded from the dietary regimes of dyspeptic patients; but, as Table I shows, from the point of view of acidity this is an

unnecessary restriction, as the acid levels were in no case higher than those resulting from milk.

Table I indicates the average readings of the experiments in this group. It would appear that so far as two-hourly feedings are concerned the actual food given is of no account; milk, as a supposedly acid-lowering food, and meat soup, as acid-raising, are shown to be of little value in either respect. Olive oil, however, is a remarkable exception, being a real depressant of acid secretion, and further experiments were designed to estimate its effect in conjunction with milk.

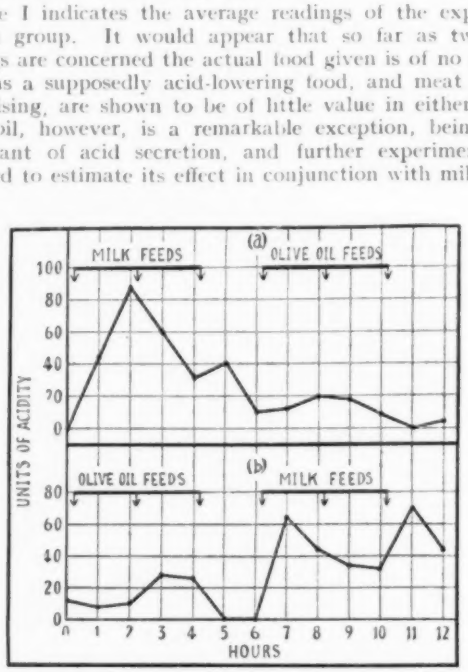

CHART I.—Hourly free acidity of gastric contents over 12-hour periods in one case, with 2-hourly feeds of *(a)* milk 10 oz. and olive oil 2 oz., and *(b)* olive oil 2 oz. and milk 10 oz.

TABLE I.—*Average Free Acidities of Gastric Contents over Periods of 12 Hours, in Tests with Various Foods given 2-hourly*

Case	F.T.M. Max.	Milk 10 oz.	Gelatin Mixture 10 oz.	Bovril 1 dr. in Water 10 oz.	Strained Meat Stock 10 oz.	Olive Oil 2 oz.	Peach-kernel Oil 1 oz.	Olive Oil Emul. 2 oz.
1 D.U.	60	53	—	—	—	31	—	53
2 D.U.	104	53	—	—	—	36	40	—
3 G.U.	80	47	—	50	43	11	—	—
4 G.U.	30	26	—	12	22	—	—	—
5 D.U.	100	97	52	64	90	—	—	—
6 D.U.	85	67	47	—	—	32	—	—
7 J.U.	90	60	50	50	—	—	—	—
8 G.U.	24	38	—	35	—	—	—	—
9 D.U.	62	33	44	—	—	—	—	—
Mean		52	48	42	51	27	40	53

Results are expressed as units in terms of c.cm. decinormal NaOH required to neutralize 100 c.cm. of fluid. G.U. = Gastric ulcer. D.U. = Duodenal ulcer. J.U. = Jejunal ulcer. F.T.M. max. = Maximum reading of fractional test meal.

Group II

Confirmation of the acid-depressing power of oil was demonstrated by this series, in which six feeds were given two-hourly by mouth, and 1 oz. of olive oil was syringed down the aspirating tube half an hour before each of the last three feeds. Reference to Table II will show that of the 9 patients examined by this method 4 showed no significant difference between the two halves of the test; in the other 5 the addition of olive oil induced a reduction of acidity of 20 to 40 units. Peach-kernel oil in one case resulted in a depressant effect similar to that of olive oil. The preliminary fractional test meals of all 9 cases gave similar curves (Chart II), and no reason could be discovered for the apparent absence in the 4 cases of a depression by the vegetable oils, an effect which when present in the other 5 was considerable.

TABLE II.—*Average Free Acidities of Gastric Contents in 12-hour Tests of Six 2-hourly Feeds of Milk 10 oz., with Olive Oil 1 oz. Half an Hour before the Last Three*

Case	F.T.M. Max.	First Half of Test: Milk Alone	Second Half: Milk and Oil
1 D.U.	45	3	15
2 D.U.	70	54	17
3 D.U.	70	31	31
4 G.U.	85	37	28
5 G.U.	60	16	5
6 D.U.	80	40	29
7 G.U.	70	14	30
8 D.U.	60	53	37
9 D.U.	—	73	68
10 D.U.	75	32 43*	3 14*
Mean		36	25

* Test repeated with peach-kernel oil.

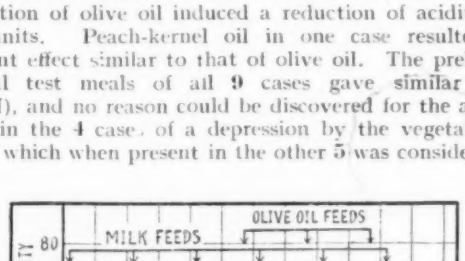

CHART II.—Hourly free acidity of gastric contents over 12 hours in one case, with six 2-hourly feeds of milk 10 oz. and olive oil 1 oz. half an hour before the last three.

Group III

The preceding data refer to results obtained with methods of treatment of a purely experimental nature, and it was felt desirable to attempt to evaluate the changes in acidity brought about by methods more applicable to routine treatment. Three patients admitted for peptic ulcer complicated by haematemesis were the subjects of this investigation, and three parallel experiments were performed: (1) Meulengracht - Witts dietary regime alone (Meulengracht, 1935; Witts, 1937); (2) that diet plus olive oil; (3) that diet plus olive oil and alkali.

The procedure was as follows: (1) On the first day gastric specimens on diet alone were analysed hourly; (2) on the second day the experiment was repeated with the addition of 1/2 oz. of olive oil half an hour before meals; (3) on the third day oil was given before meals and 1 drachm of an alkaline mixture (equal parts of mag. carb. pond., bismuth. carb., sod. bicarb.) after meals. The results are summarized in Table III. With the diet alone readings are fairly high; in the series they varied from 30 to 80 units, and a fall of 10 to 20 units followed each feed. The use of oil depressed the acid level considerably, although in no case did it entirely obliterate free acid. With oil and alkali the reduction was more pronounced, several specimens being neutral in reaction; maximal values, however, were still high.

TABLE III.—*Average Free Acidities of Gastric Contents over 12-hour Periods in Patients on the Meulengracht - Witts Diet, with and without Olive Oil and Alkali*

Case	F.T.M. Max.	Diet Alone	Diet + Olive Oil ½ oz. a.c.	Diet + Olive Oil ½ oz. a.c. + Alkali 1 dr. p.c.
1 G.U.	45	48	31	—
2 D.U.	55	49	40	31
3 D.U.	90	61	50	33
Mean		53	40	32

These experiments show that a dietary scheme which was designed to promote healing of an ulcer does nothing to lower acidity. Olive oil, as in the previous groups, plays its part in reducing acid levels, and a still greater fall is obtained by a combination of oil and alkali.

Group IV

The continuous intragastric drip apparatus has recently been much used experimentally to obtain a constant reduction of acidity. The substances in most common use have been milk (Winkelstein, 1933; Nicol, 1939) and aluminium hydroxide (Woldman, 1937; Woldman and Rowland, 1936; Woldman and Polan, 1939; Browne and McHardy, 1939; Eads, 1940). In the present series other simple foods and drugs have also been investigated. All 7 patients of this group received a standard "ulcer diet" consisting of three meals of easily digested food, not necessarily fluid, and three intermediate feeds, mainly of biscuits and milk. The acid levels with this diet alone were

similar to those in patients treated by the Meulengracht - Witts regime, described above, although the ulcer diet was fuller and more solid: it was thus again demonstrated that such dietary schemes are in themselves of little value in the control of hyperchlorhydria. The substances used flowed at the rate of 10 to 15 drops a minute into the stomach, through either a pharyngeal or a nasal tube with the tip at the cardia, from a container hung above the bed. At hourly intervals the tube was disconnected and swallowed further until the tip was near the pylorus; after air had been injected to clear it, gastric samples were removed, and the tube was withdrawn to its former position and reconnected to the apparatus.

TABLE IV.—*Average Free Acidities of Gastric Contents over 12-hour Periods in Patients on the "Ulcer Diet" and a Continuous Intragastric Drip of Various Substances*

Case	F.T.M. Max.	Diet Alone	Diet and Drip of				
			Milk	Aluminium Hydroxide	Olive Oil	Bovril	Water
1 D.U. ..	70	44	24	30	—	—	—
2 G.U. ..	37	65	10	4	29	41	—
3 D.U. ..	104	81	27	21	67	—	—
4 D.U. ..	48	60	18	2	41	—	—
5 G.U. ..	60	42	41	26	—	—	—
6 G.U. ..	63	46	5	4	29*	—	34
7 D.U. ..	68	63	17	—	—	—	—
Mean ..		57	20	14	41	41	34

* Drip of olive-oil emulsion.

Table IV summarizes the findings by this method. A drip of water was taken as a control, and, as was to be expected, it caused no significant alteration to the curve resulting from diet alone; bovril was similarly inactive. The acid-depressant action of olive oil was again in evidence: both undiluted and in emulsion form it reduced the general level to a considerable degree, although the minimal readings were still about 20 units. With both milk and a suspension of aluminium hydroxide (aludrox) the results were remarkably constant and effective; they regularly obliterated free acid, and one case was noteworthy in that no readings after the first were above the base-line. Chart III illustrates curves from one patient, and shows the effects of milk and aluminium hydroxide.

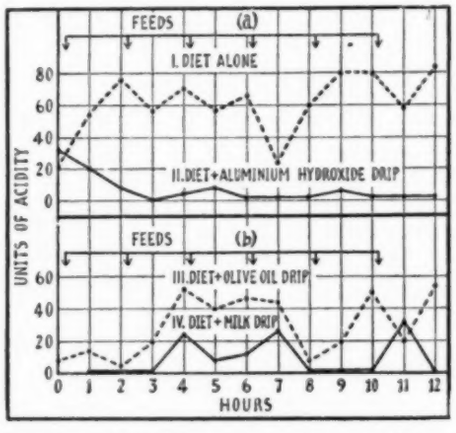

CHART III.—Hourly free acidity of gastric contents over 12-hour periods in one case on the "ulcer diet" with continuous intragastric drip. *(a)* i,....., diet alone; ii,——, diet plus aluminium hydroxide drip. *(b)* iii,....., diet plus olive oil drip; iv,——, diet plus milk drip.

It can be concluded from this part of the study that with chosen substances, used by a continuous-drip method—for example, milk and aluminium hydroxide—an effective control of hyperchlorhydria is obtained. An explanation is required, however, for the comparative failure of olive oil to do so alone, and some possible reasons are set out below.

Discussion

An investigator reporting alterations to gastric acidity in peptic ulcer must consider (*a*) the mechanisms involved in such alterations, and (*b*) their relation to healing. The factors concerned in the former are: (1) the motility of the stomach; (2) the diminution of acid secretion; and (3) the neutralization of acid juice already produced.

Specimens taken an hour after the introduction into the stomach of any substance (especially in fluid form) do not show the changes in acidity which occur immediately, and by the end of an hour a rise in acid level may have taken place, whereas there had been immediate depression or neutralization. This may well explain the results with bovril and meat soup (Group I) and the initial fall in acidity with milk reported by Nicol (1939).

The present work was concerned, however, not with the immediate reaction to any food, but with the general effect over periods of prolonged feeding. The experiments indicate that there is no continued lowering of acidity when feeds are given two-hourly, in which circumstances a meal passes out of the stomach too rapidly for efficient neutralization because of enhanced motility, fresh secretion accumulating to raise the acidity of the emptying stomach to its previous high level. The initial fall after food may also be partly accounted for by dilution.

The continuous drip of milk induces a constant neutralization, enough milk being left to control the constant acid secretion, and this process can be maintained indefinitely. The effect is also obtained by the continuous drip of aluminium hydroxide, the properties of which, and of its pharmacological ally magnesium trisilicate, have been investigated very fully by many workers: to mention a few, Einsel and others (1932, 1934), Adams and others (1936), Emery and Rutherford (1938), Adams (1939a, 1939b), Bennett and Gill (1939), McIntosh and Sutherland (1940), in the case of the former; and, in the latter, Mutch (1936), Mann (1937), Kraemer (1938), Kraemer and Aaron (1940), Reid (1939). Experiments show that these agents neutralize HCl more slowly than do other alkalis, and from clinical experience their antacid effect is known to be spread over several hours.

Why should olive oil reduce acidity to a greater extent when given as a food (Group I) or added to the diet (Groups II and III) than when supplied continuously (Group IV)? If the hypothesis mentioned above holds good the explanation must be that oil has little acid-neutralizing power, and that its effect is in the main due to control of the other factors involved in the maintenance of acid level—namely, reduction of actual secretion and diminution of gastric motility. It is believed by many that the problem of motility is an important one, and that it throws light on the inconsistent results often obtained.

It is evident that undue stress has been laid on reduction of HCl alone as a necessary provision for the healing of gastric ulcers. Brown and Dolkart (1937, 1939) find that fluctuations in gastric acidity bear no relation to the onset of recurrence. Bloomfield and French (1938) obtain no correlation between healing and acidity, as measured by the "basal secretion" method. Wosika and Emery (1936) report that although the Sippy regime is effective in controlling acidity, they could demonstrate no relation between symptomatic relief and effectiveness of neutralization; while Steigmann and Fantus (1940), in their investigations of various antacids, showed that relief of pain could easily be produced, but that lowering of acidity occurred in less than one-quarter of their cases. Their conclusion is that ulcer therapy should not be based solely on methods of decreasing gastric acidity. The majority of these investigators, however, refer to acid levels before and after some particular application of treatment, and it is well known that hyperchlorhydria cannot be permanently cured by medical means. The matter is summarized by Mann (1939), who affirms that the important factors in the development of a peptic ulcer are chemical and mechanical. Healing always begins immediately after the surface is

protected from the acid gastric contents. The attainment of a low acid level is only one method of realizing this; such an effect is most completely attained by neutralization of the gastric juice as soon as it is secreted, a process which can only be carried out effectively at present by means of the continuous intragastric drip apparatus. This, however, is not a practicable method for the vast majority of cases, and should be reserved for those of especial severity.

The question of gastric motility in cases of ulcer would appear to be the problem of the future, and the next step ahead seems to be the discovery of some practical means of ensuring continuous diminution of gastric motility. Olive oil does not supply this want, and the continuous intragastric drip, as has been indicated, will not fulfil the condition of practicability. The purpose of further research must be to find some more effective method.

Summary

An investigation into the effects of various foods and simple drugs on the gastric hyperacidity of peptic ulcer is recorded, particularly with a view to prolonged acid reduction.

Certain foods, notably milk, when given two-hourly, have little persistent neutralizing power; these foods, although diverse in nature, produce similar acid levels.

Olive oil is strongly acid-depressant when supplied as a food or given before meals.

Considerable reduction of acidity results from a combination of oil and alkali with a suitable diet which by itself is ineffective.

The continuous intragastric drip apparatus provides at present the only means of constantly maintaining a low acid level. Milk and aluminium hydroxide are most effective in this method; oil is less so.

The mechanisms of these alterations in acidity are discussed.

Some considerations of the relation of acid control to healing of an ulcer are examined.

Investigation of alterations in gastric motility—i.e., some method of controlling the emptying of the stomach so that remedies are retained to ensure continuous neutralization of acid as it is formed—is suggested as perhaps the most important problem requiring further study in the treatment of peptic ulcer.

This work was performed in the Gardiner Institute of Medicine, Glasgow University and Western Infirmary, during the tenure of a Carnegie Medical Research Scholarship, which was interrupted owing to war service. I wish to express my gratitude to Prof. J. W. McNee for his constant advice and helpful criticism. I have to thank Messrs. John Wyeth and Brother, Ltd., for a supply of aludrox, and for the continuous intragastric drip apparatus.

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Medical Memoranda

Interstitial Subcutaneous Emphysema complicating Pulmonary Tuberculosis

After reading the case report by Dr. T. B. L. Bryan in the *Journal* of December 21, 1940 (p. 868), I looked up the records of a case which was under my care in the Santorium Pavilions, City Hospital, Walker Gate, Newcastle-upon-Tyne.

CASE RECORD

The patient, a man aged 27, was first seen by me in consultation in his home on April 21, 1936. He gave a history of not being well for about four months, the last five weeks of which had been spent in bed. There was no history of tuberculosis, but three years previously he had had an operation for a rectal abscess. The family history with regard to tuberculosis was bad. A sister was a sputum-positive case of pulmonary tuberculosis, a brother who had been a sputum-positive case of pulmonary tuberculosis died in 1934, and another brother who had been a sputum-negative case of tuberculosis died in 1919. The home conditions were poor; the family of three lived in a two-roomed tenement.

On examination the patient was pale and ill and his general condition was poor. He had impaired percussion over both sides of the chest, with crepitations more pronounced on the right. He was admitted to hospital on April 22, 1936. While there his temperature varied between 99° in the mornings and 103° in the evenings, and his pulse was rapid, usually about 120. A radiograph showed very widespread scattered densities in both lungs, with cavitation in each upper zone below the clavicles. His sputum was negative for tubercle bacilli. On April 25 he suddenly developed emphysema of the tissues of the neck and upper part of the chest and back. This caused some dyspnoea. A radiograph taken the same day showed a small left lateral spontaneous pneumothorax and also the air in the tissues of the neck. He was then transferred to the Newcastle General Hospital to see if surgical intervention could assist him and perhaps lessen the dyspnoea and distress. It was, however, decided that he would not be benefited by any operation, and he was brought back to the City Hospital on May 1. He continued to retrogress, and he died on May 31, 1936. The surgical emphysema which persisted until his death was limited to the neck and chest in its upper half. Permission for a post-mortem examination was not obtained.

COMMENTARY

This patient, who had extensive acute pulmonary tuberculosis, developed a left spontaneous pneumothorax and, at the same time, subcutaneous emphysema of the tissues of the neck and upper half of the chest. Spontaneous pneumothorax as a complication of pulmonary tuberculosis is common, but subcutaneous emphysema is a much rarer condition. Since I became associated with the Sanatorium Pavilions in 1923 there have been 6,266 admissions of cases of pulmonary tuberculosis and 1,512 deaths. The case recorded is the only one that has developed subcutaneous emphysema.

Fishberg (1932) states that interstitial subcutaneous emphysema is not unknown in acute pulmonary tuberculosis and is very rare in chronic tuberculosis. Meade and Stafford (1930) review the condition and describe some cases, but it is not often recorded in medical literature.

I am indebted to Dr. J. A. Charles, medical officer of health for Newcastle-upon-Tyne, for permission to publish this case.

GEORGE HURRELL, M.D., D.P.H.
Tuberculosis Medical Officer, Newcastle-upon-Tyne.

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The wisdom of subsidizing private growers of cinchona in India is being urged by the Indian Chemical Manufacturers' Association, which points out that if efficient anti-malarial treatment is to be provided in India, at least 6 lakh lb. of quinine will be required annually. The present consumption is about 2 lakh lb., of which India produces about 70,000 lb., the remainder being imported from abroad.

Reviews

CHINESE MEDICAL THOUGHT

The Chinese Way in Medicine. By Edward H. Hume. (Pp. 190 $2.25 or 14s. net.) Baltimore: The Johns Hopkins Press; London: Oxford University Press. 1940.

Dr. E. H. Hume was connected with the Peking Medical College of the Rockefeller Foundation and became first Principal of the Yale Medical College in China. He had a gift for cultivating Chinese friendships which gave him ample opportunities for discussing the merits and demerits of the age-old empiric system of medicine as compared with modern scientific medicine. From the records of the Shang Dynasty (1766-1122 B.C.), which saw the evolution of early concepts of the oneness of all life, a group of metaphysicians sprang up who gave form to the prevailing ideas of still earlier years and taught that the phenomena that make up health and disease related to the universe as a whole. They contended that the life of man in all its phases is inseparably linked with every other form of life, whether of animals and birds, of trees and plants, or even the less perceptible life of material things. Empiricism in China was a blind acceptance of traditional beliefs as against independent inquiry.

Dr. Hume's book is a survey of a system of Chinese medical thought which is philosophical in conception and has evolved practical procedures of real value for both diagnosis and treatment. The author thinks that this system, far older than Greek or Arabian medicine, has proved adequate to the needs of an Eastern Asiatic civilization. He deals with three aspects of his subjects: (1) the universe and man in Chinese medicine; (2) the founders and conspicuous exemplars of Chinese medicine; (3) some distinctive contributions of Chinese medicine. High up among China's contributions of permanent value is the establishment of medical libraries and the preparation of special monographs. One compiler has estimated the number of known medical books at 12,600 volumes. Nor did medicine find itself concerned with theory and practice only. The legal aspects of the profession's task were also faced frankly. A volume published during the Sung Dynasty (A.D. 960-1279) was the one recognized coroner's handbook before the establishment of the Chinese National Health Administration in 1927.

In reading this book the thought frequently occurs that "there is nothing new under the sun." The Chinese had practical inoculation against small-pox from the sixth century A.D. Gonorrhoea was known and accurately described from the earliest times, but syphilis was not introduced to China till A.D. 1505. A manual on obstetrics and gynaecology published in A.D. 1661 laid special stress on pre-natal treatment. Ephedrine (ma-huang) has long been known to the Chinese, as also chaulmoogra oil for leprosy. These are but a few of many noteworthy points. The volume is interesting and informative throughout and concludes with a good bibliography which gives evidence of much painstaking research by the author.

PRACTICAL DERMATOLOGY

Dermatologic Therapy in General Practice. By Marion B. Sulzberger, M.D., and Jack Wolf, M.D. (Pp. 675; illustrated. 22s. 6d., or $4.50 post paid.) Chicago: The Year Book Publishers, Inc.; London: H. K. Lewis and Co.

Dermatological therapeutics are so intimately bound up with diagnosis that any work on skin treatment must devote a large space to questions of diagnosis, and this book is no exception, but being intended for general practitioners it almost exclusively deals with the commoner affections of the skin after an opening essay of considerable length and value on the general principles of dermatologic therapeutics which most practitioners will find very useful.

There is one very good illustration of the extent to which cutaneous treatment is bound up with diagnosis, and that is the admirable chapter on the management of drug eruptions. This is devoted for the most part, as it must be, to the detection of the peccant drug—in other words to the diagnosis of the eruption. The chapter is well illustrated and there are some excellent tables to assist the practitioner in making his diagnosis, but the space devoted to actual therapeutic measures is small. After all, the only therapeusis needed in 90% of drug eruptions is the discontinuance of the drug which is doing the mischief. These considerations lead us to doubt whether it is really legitimate to label books as ostensibly devoted solely to cutaneous therapeutics. In our experience the more valuable such works are the greater the proportion of space devoted to diagnosis. We really fancy that the fundamental reason for bringing the suggestion of therapy so prominently into the title is to offer a special attraction to the practitioner by appealing to his well-known (and very natural) hunger for help in treatment.

It is always interesting to note the peculiarities of terminology in American writings. Our transatlantic brethren are never afraid of a new word (whether it be needed or not!), and here is one which certainly is a new one to us in this connexion, and that is an "id." It appears that an "id" is an eruption which is secondary to a fungoid infection of the skin and is a convenient abbreviation for such clumsy terms as dermatophytid, trichophytid, etc. It certainly has the merit of brevity. Very sensibly Sulzberger warns the practitioner against the too facile diagnosis of fungoid infection of the skin, a diagnosis which, as he says, has been much overdone of late years. He points out that the management of the "ids" requires considerable tact, as their behaviour closely resembles that of ordinary eczematous dermatitis, and the employment of gross antifungoidal remedies (for example, iodine) often merely causes a regrettable exacerbation of the eruption. This may happen even when actual mycelium has been found on the feet or elsewhere, and when there is a positive reaction to trichophytin skin tests. The habit, too common at the present time, of diagnosing an "id" without such positive evidence of fungoid infection he greatly deprecates.

Altogether this book is much to be commended as a clear exposition of practical modern dermatology. It is a sound guide to the family physician and there are few dermatologists who will not glean useful hints from its perusal.

BIOCHEMICAL CLASS WORK

Laboratory Manual of Biochemistry. By Benjamin Harrow, Ph.D., Gilbert C. H. Stone, Ph.D., Ernest Borek, Ph.D., Harry Wagreich, Ph.D., and Abraham Mazur, Ph.D. (Pp. 119; 19 illustrations. 7s. 6d.) Philadelphia and London: W. B. Saunders Company. 1940.

Prof. Harrow's laboratory manual describes an up-to-date course of carefully selected class experiments. Starting with the usual qualitative tests and experiments the course leads on to a number of well-chosen quantitative estimations. The experiments are so carefully described that the student should have little excuse for failure in their performance. Although the authors make no such claim the course is well suited to medical students. The book is certainly one which merits careful examination by teachers of practical (animal) biochemistry and which they will be tempted to keep on their shelves. It is an ideal practical book for class use and is offered at a reasonable price, for its 119 pages are well filled and there is no superfluous descriptive matter. Even in the hands of students the wire-O binding should survive the course.

While the reviewer has nothing but praise for the book as a whole, there are a few curious omissions. Blood spectra, pyridine-haemochromogen crystals, Fehling's test, and Harrison's test for bile pigments are not mentioned. The student is frequently instructed to examine and draw crystals; it would have been more helpful to provide good drawings or photographs of these crystals in place of the illustrations of Kjeldahl's apparatus and a colorimeter. But these omissions are easily made good by the teacher and do not detract from the value of a book which is certainly among the best of its type and merits a wide circulation.

A MISSION DOCTOR IN THE CONGO

Congo Doctor. By W. E. Davis, M.D. (Pp. 286; illustrated. 12s. 6d. net.) London: Robert Hale, Ltd. 1941.

The greater part of Dr. Davis's book deals with the people, white and native, who inhabit the Coquilhatville Province of Belgian Congo. When the author left the U.S. Marine Corps, in which he served in the last great war, he resolved to devote himself to missionary work. So he went to college and, while there, met the girl who later became his wife and persuaded him to be a mission doctor in the Congo. The result surpassed any dreams he had ever had, and his ten years in the jungle were a tremendous experience that he never regretted. Judged by our present-day standards the Congolese are a backward people, for they have no need of progress, living as they do in a region where very little effort is required for subsistence. Nature is adequate and calls for but a minimum of work from her creatures. Hidden away in the dense fastnesses of their tropical woods they lead the simple life, and time has no significance for them.

The author led a busy professional life; during his last year at Lotumbe over 65,000 patients came to the hospital dispensary, and he performed 536 major operations with a mortality of less than 1%. He had his full share of dramatic cures: he notes that "there is nothing more striking in medical therapy than the effect of neosalvarsan on a full-blown case of yaws. The foul disgusting yellow pustules which cover the entire body of the sufferer frequently fade away in the course of a few days. One might almost say they disappear before one's eyes." He had many cases of enormous elephantiasis of the scrotum; "hundreds came who had scarcely walked for years and returned to their villages able to lead an active life."

The book is an encouraging account of the opportunities for great good which a capable and self-reliant medical man can find in a primitive country. The author speaks well of the Belgian Colonial Administration, and gives graphic word pictures of the jungle forests and their inhabitants.

Notes on Books

Dr. J. W. FISHER'S little book, *Psychology and Mental Disorders for Nurses*, is meant to be a refresher for mental nurses preparing for their examinations. The first part is a survey of normal psychology which is rightly rather fuller than the next, since without the fundamentals the practical issues of a subject cannot be comprehended or successfully put in practice. It is always difficult to know how much nurses can understand in their reading, and of necessity abbreviation means that simplicity and clarity are to some extent sacrificed. Most nurses have neither time nor energy after their day's work to read much, and some books will be too long and others too concentrated to be useful to them. Whether the present volume, which in addition to normal psychology covers the whole field of mental illness as well as practical hints for mental nurses, will steer between these two extremes is for the nurses themselves to decide, but it is a clear compact little book which should be useful at least to some of those for whom it is written. The publishers are Edward Arnold and Co. and the price is 4s.

Preparations and Appliances

AN APPARATUS FOR CONTINUOUS OR INTERMITTENT ADMINISTRATION OF PENTOTHAL SODIUM SOLUTIONS

RODERICK A. GORDON, B.Sc., M.D., D.A., Captain, Royal Canadian Army Medical Corps, writes:

The apparatus described below is designed with three purposes in mind—namely, (1) to provide a means of continuous or intermittent administration, over considerable periods of time, of pentothal solutions which would keep the needle patent and allow the anaesthetist freedom to attend to the airway, blood pressure, and pulse determinations; (2) to give rapid control of anaesthetic level; (3) to provide a portable apparatus which can be used for several patients in succession without the necessity for re-sterilizing the whole of it and without the need for mixing fresh solutions for each patient.

The apparatus, shown in Fig. 1, consists essentially of two bottles, one containing normal saline and the other pentothal

FIG. 1.

sodium solution, connected through independent drip bulbs and rubber tubing to a Y adapter fitting to the intravenous needle. The rubber bungs in the bottles are arranged to lock in, and the solutions are delivered by pressure applied to the bottles through a Y connector by a rubber bulb syringe. Flow is controlled by a screw pinch-cock on each tube, placed between the bottle and the drip bulb. The whole apparatus is arranged to fasten on to a stand, and is readily removed for boiling. The stand has a cover which clips on like the cover of a portable typewriter, and makes it possible to transport the whole apparatus after sterilization (Fig. 2). Two adapters are provided (Fig. 3), each attached to two short lengths of rubber tubing, the tubing having glass windows in the form of short glass connectors.

The interchangeable connector allows the apparatus to be used for several patients in succession without the necessity for re-sterilizing the whole equipment. The glass windows are used to determine any flow of blood back through the needle. If blood is allowed to back up past the interchangeable length of tubing it becomes necessary to wash and re-sterilize the whole tubing.

This arrangement allows the delivery of either the pentothal or saline solution simply by turning the screws of the pinch-cocks, adequate pressure in the bottles being maintained by occasionally squeezing the rubber bulb. The level of anaesthesia is controlled with a minimum of lag by the use of the double tubing to the Y adapter, thus cutting down the "dead space" to the volume of the adapter and needle.

We have used this apparatus with success during the past six months, both for inducing and maintaining anaesthesia for surgical procedures lasting up to two hours, and to keep

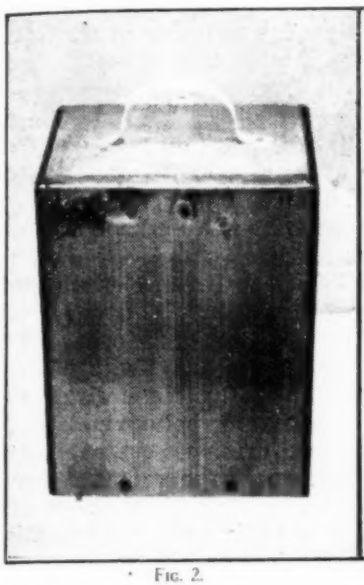

FIG. 2.

FIG. 3.

patients asleep during procedures undertaken with spinal anaesthesia or regional blocks. We prefer, after this amount of experience, to use a 2% solution for maintaining full anaesthesia, and a 1% solution to maintain light anaesthesia in association with blocks. In addition to the obvious technical advantages of the method there is a considerable saving in the amount of drug used per unit time of anaesthesia.

Nova et Vetera

CHLOROFORM IN THE 'EIGHTIES

HINTS TO YOUNG ANAESTHETISTS

Many young doctors, during this war, will be called on to administer chloroform to patients and may feel not too confident over the business. Having given chloroform or seen it given for well over fifty years, I offer a few hints to junior colleagues. My impression is that the art of giving chloroform is passing away. The surgeons to the Glasgow Western Infirmary about fifty years ago never seemed to have deaths from chloroform. In a debate on the subject, about that time, under the chairmanship of Dr. William Macewen (later Sir William), Prof. Macleod stated that up to that point he had never had a death from chloroform. Macleod used a folded towel placed over the face, with his finger lifting the edge of the towel away from the mouth about one or two inches; he gave the chloroform, to begin with, slowly. Thus Macleod, in roughly 10,000 cases, had no deaths from chloroform. I believe the same could be said of Prof. George Buchanan, Hector Cameron, and Alexander Patterson, all contemporary surgeons to the Western Infirmary.

The Glasgow Tradition

Buchanan allowed his students to give chloroform, and they unwittingly showed us how not to give it. Time and again I have seen Buchanan run and dip the end of a towel in cold water and vigorously slap the patient's bare chest two or three times. The effect was magical, the patient suddenly sitting upright on his haunches and looking round bewildered. If a patient collapses under chloroform, becoming pale from heart failure, Buchanan's method should be at once adopted, along with sudden inversion of the body, by getting the lower end of the table thrown up into the air. These two measures alone will frequently save life. In the discussion alluded to, reported in the *Glasgow Medical Journal*, Dr. Walker Downie referred to a case of Marion Sims's, in Paris, where the patient collapsed and the great surgeon Nélaton advised inversion of the body. When the body was inverted recovery took place; but inversion, with artificial respiration, had to be maintained for an hour and a half. I have had occasion to use Buchanan's method of the wet towel in patients brought into a police office, comatose from whisky, and found it most effective in about ten to fifteen minutes.

The pulling out of the tongue with forceps I look upon as an indication of faulty administration. The secret of giving chloroform is not to give it too concentratedly in regard to the oxygen of the air. I fancy if chloroform were given slowly and sufficiently diluted with oxygen it could almost be given *ad libitum*. Lister stated that Syme, the great Edinburgh surgeon, never had a death from chloroform up to the end of his operating career. Macleod taught his students to watch the breathing, the colour of the lips, and the pulse. The great danger of chloroform—which in my opinion arises from too large a dose at a given time and in reference to the oxygen—is heart failure.

For practical purposes the young medical man should confine the dropping of his chloroform on to one of the lower quadrants of the mask, and on no account splash it over the whole mask. If possible a small bottle of ether should be carried as well as the chloroform; and if the patient begins to turn pale ether should at once be substituted for chloroform. For asphyxia, artificial respiration, pulling out the tongue, venesection, etc., will be resorted to. But such complications can be prevented.

Dornoch. J. T. MACLACHLAN, M.D.

MORE OLD MEDICAL BOOKS

Hard upon the dispersal of Sir D'Arcy Power's library come some more opportunities for medical book collectors. Messrs. Sotheby have been selling a library, largely botanical, which included Culpeper's *English Physitian*, 1st edition, **1652**; Dodoens's *Niewe Herball* . . . now first translated out of French into English by Henry Lyte, black letter, **1578**; the *Grete Herball* which geueth parfyt knowlege and understandyng of all maner of herbes . . . for they hele and cure all maner of dyseases and sekenesses, Southwarke, Peter Treveris, **1526**; Jerome of Brunswick's *Noble Experyence of the Vertuous Handyworke of Surgeri*, black letter, **1525**; another similar treatise on herbs by the same author, **1527**; and William Turner's *Herbal*, **1568**, with a Booke of the bath of Baeth in England, bound up with Jerome of Brunswick's most Excellent and Perfecte Homish Apothecarye, translated out of the Almaine Speche by Jhon Hollybush [i.e. Miles Coverdale], black letter, **1561**.

Messrs. Davis and Orioli, now of Wallingford, lately of Bloomsbury, have issued a long catalogue of old medical books, only a few of which can be noted here. Alexis of Piedmont's *Secretes*, translated into English by William Ward, the three parts bound together (**1560, 1563, 1566**), is offered at **£15 15s.** Philip Barrough's *Methode of Physicke*, **1583**, went through many editions: the first one is of the greatest rarity, and a copy of it is priced at **£48**; little is known of the author beyond the fact that he graduated in surgery at Cambridge in **1559**. Andrew Boorde's *Breviarie of Health* is represented by an edition of **1575**; Sir Thomas Browne's *Religio Medici* by the second edition, of **1645**. An interesting item is the Playbill of the Edinburgh Pantomime of January, **1848**, which mentions "Doctor Chloroform's Establishment" and goes on to refer to the "new anaesthetic agent, Sulphuric Ether," listed at **15s.** Sir T. Elyot's *Castell of Helth* is a reprint, probably of **1560**, though it has the title page of the original edition of **1534**. The original recipe for Dover's powder, not quite the same composition as that which now passes under this name, is contained in the Widow Bradley's *Ancient Physician's Legacy to his Country*, **1733**; another widow whose book is of some interest is Mrs. John Hunter, who published a volume of poems in **1802**; the copy now offered is inscribed by the great surgeon's relict on the flyleaf . . . perhaps the only one of her poems which is still familiar is the lyric, "My mother bids me bind my hair." John of Gaddesden (**1280-1361**), physician to Edward II, is represented by the rare fourth edition of his famous textbook, **1595**: it was first published in **1492**. An "association" copy of a century ago is an issue of Townsend's *Physician's Vade Mecum*, with autograph of John Snow on the title page and 28 pages of his MS. at the end, giving details of his professional work in London from **1838** onwards: he is best remembered as one of the earliest pioneers of the scientific study of anaesthesia, which he administered to Queen Victoria at the birth of her two youngest children (one of whom, H.R.H. Princess Beatrice, is still alive) to the scandalization of many narrow-minded pietists.

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CHEMOTHERAPY IN ACUTE OTITIS MEDIA

Harvey Cushing once pointed out that progress in medicine occurs mostly by fission, and that special departments and groups, once they are strong enough to be independent, seldom fuse either with one another or with the parent body. He revealed a proposal for the creation at Johns Hopkins University, on the resignation of Osler, of a *super*-professorship of medicine to keep all the departments in contact and in proper relationship with one another. The scheme never matured because W. H. Welch, who was asked to undertake the task, refused; but it is not difficult to see what influence the holder of such a position might exercise. One matter that would certainly occupy his attention to-day would be the control of acute bacterial infections by chemotherapy. Every clinical department, both general and special, has turned eagerly to the new resources. Enthusiasm and sometimes lack of judgment have been manifested, so that the abuse of chemotherapy has become as important a subject for inquiry as its use. A speaker in a recent debate named the quantity of the new drugs which had been dispensed in one year in a large hospital in London, and the figure was so large that it is impossible to avoid the conclusion that a respectable fraction must have been misapplied. This is probably the state of affairs in many other hospitals. The early and most spectacular successes with chemotherapy were in cases of septicaemia, mostly obstetrical in origin; but such cases are sometimes otogenic, and aural surgeons soon found that not only septicaemia but also meningitis could be controlled, and that recovery could become commonplace in cases which a few years ago would certainly have been fatal. Recovery, however, if no longer a miracle, is still not the end of every case. Why should there be failures? How and to what extent should chemotherapy be used in those early infections where complications have not yet arisen and the trouble is likely to be self-limiting?

The answer to the first question is twofold. It is necessary to be certain that the infecting organism, both in the primary focus and in the area to which the complication has extended, is one which may be expected to yield to the treatment. Clinical examination, however careful and frequent, is nowadays not enough. Bacteriological examination is essential so that the appropriate drug, if there be one available, may be administered. Generally sulphanilamide is chosen, but in a pneumococcal infection it may be necessary to change to sulphapyridine or sulphathiazole. Secondly, the treatment cannot succeed in the presence of a collection of undrained pus or if there is an infected thrombus anywhere in the area concerned. It is no use demanding the impossible of these drugs, and to employ them in such circumstances only brings discredit on a potent remedy; for either the patient will die unrelieved or there will be a temporary but only apparent clinical improvement which masks the real state of affairs. In the latter case the complication will ultimately prove fatal, even if it seems to disappear, as in the case of meningitis, for it will be fed afresh from the primary focus of suppuration if this is not eliminated. The treatment required may vary from a simple paracentesis of the tympanum to an extensive mastoid operation. If there is a venous thrombosis the clot need not, in theory, be disturbed so long as it is aseptic; but how often this occurs may be guessed from the usual clinical history of such cases. In practice it should be removed until there is free bleeding from each end of the opened sinus. If it extends downwards out of reach to the jugular bulb there should be no hesitation in tying and dividing the jugular vein in the neck, so that the bulb can drain when the ligature is removed from the upper end of the vein. It seems remarkable—even taking for granted the potent effect of the appropriate drug on each organism—that in purulent streptococcal or pneumococcal meningitis so many recoveries ensue, for the ease with which a collection of pus may become entangled in the meshes of the arachnoid must be a severe handicap upon the action of the drug. It may be, therefore, that a basal meningitis, on account of the size of the cisterns, is more prone to resolution than a meningo-cortical extension, which would easily become encysted and localized into an abscess. For this reason a very high percentage of recoveries from meningitis can be expected only when the treatment is administered at an early stage.

Chemotherapy has proved its worth under desperate conditions. The next question is how and to what extent it should be used in early infections that are likely to be self-limiting and which might recover spontaneously or with simple, old-fashioned treatment. Once an acute infection of the middle ear has been initiated it is impossible to predict what its course may be. It is therefore wholly reasonable to adopt a treatment that may shorten its duration and, by promoting early resolution of the inflammation, give protection against complications. That chemotherapy can do this is not merely a general clinical impression; the figures of Horan and French[1] give satisfactory proof. In a series of 607 cases from 1934 to 1937 there were 138, or 22.7%, needing the mastoid operation. In 621 cases treated by chemotherapy from 1937 to 1939 only twenty-one, or 3.4%, required operation; there were no deaths in the second series. Wesley Bowers[2] has produced similar evidence. In a series of 793 cases, 396 were treated by chemotherapy. He found that both the duration of the discharge and the proportion of patients needing mastoid operation were reduced in this way by 50%.

The statistics of Horan and French present two convincing features. The numbers of the control series and the experimental series are nearly the same, and the clinical material is of a homogeneous character, being drawn from the personnel of the Royal Navy. Not only is the number of mastoid operations materially reduced, but the absence of any fatality is strong evidence of protection against complications. There is, therefore, justification from the evidence (supported by the observation of Wesley Bowers) for administering

[1] *Lancet*, 1940, **1**, 680.
[2] *J. Amer. med. Ass.*, 1940, **115**, 178.

either sulphanilamide or sulphapyridine in acute otitis media. But this is not to be done in a casual manner, for although the administration is an exceedingly simple matter it is not without some risk. Here again it is necessary to know the nature of the infecting organism if it is to be made certain that an appropriate drug is available for administration. It is no excuse to plead that because the tympanic membrane has neither ruptured nor been incised there is no discharge to examine. The infection comes from the nasopharynx, and material taken from there will give the bacteriological diagnosis. In any case discharge collected from the meatus is liable to be contaminated from the skin.

In all statistics the majority of infections are shown to be streptococcal, though the pneumococcus is nevertheless frequently found. T. B. Layton has divided the infections of the middle ear into the nasopharyngeal and the cutaneous—the former travelling by the Eustachian tube and the latter reaching the tympanum from the skin of the meatus through a perforation. This assumes that the primary infections are streptococcal and pneumococcal, while the *Staphylococcus aureus* is a secondary infection from the meatus; along with it go a number of other organisms, including *Staphylococcus albus*, *B. coli*, *B. proteus*, and *B. pyocyaneus*. The latter are no doubt secondary invaders. But the question which is difficult to settle is whether the *Staphylococcus aureus* attacks the middle ear as a primary nasopharyngeal infection. E. P. Fowler[3] of Columbia University, in a series of 2,775 cases in the years 1933 to 1939, found pure cultures of staphylococcus in 36.7%. This is far higher than most authors report, and suggests contamination in taking material from the meatus. It is probable that the *Staphylococcus aureus* is occasionally the primary organism (but much more rarely than Fowler suggests), and that it easily overgrows and masks the primary organism in cultures from the meatus. Certainly it is remarkable how constantly the *Streptococcus pyogenes* is found by the bacteriologist when the culture is made at an operation from pus in the mastoid process or—what is the only absolutely satisfactory method—from chips of bone. This explains the frequent success of sulphanilamide given empirically, though it affords no justification for neglecting bacteriological examination or for not taking care to avoid contamination in collecting material for the laboratory.

The general risks attaching to the administration of these drugs—such as gastric intolerance, leucopenia, and occasionally agranulocytosis—are well known and concern only the exceptional patient. It is perhaps not practicable to obtain blood counts in every case, but if the clinical course is not satisfactory and suggests unusual sensitiveness, which is naturally beyond control, the blood examination should certainly not be omitted. There does, however, appear to be a decided though easily controlled risk arising from insufficient dosage. This insufficiency may come about either by administration in too small quantity (which for an adult should be 2 grammes as an initial dose—continued at the rate of 1 gramme every four hours, taking the age and especially the weight of the patient into consideration), or by administration over too short a period (which should extend to two or three days after all clinical signs have disappeared). If the administration is stopped too soon there may be either a relapse or a subsidence of symptoms, masking incomplete resolution and leading to complication later. Repeated examination of the ear is essential; if the patient is in pain or the tympanum is seen to fill with fluid under tension, paracentesis should not be withheld in the hope that the process will resolve without spontaneous perforation of the membrane. The neglect of paracentesis at the right time may be a factor causing either incomplete resolution and an adhesive otitis with subsequent deafness, or the need for a mastoid operation. Unless these precautions are observed and the patient is kept in bed, it is better to employ the ordinary methods of treatment only. Fowler recommends that treatment by chemotherapy should begin a week or ten days after onset if the patient does not seem to be getting on well without it. It seems reasonable, however, to begin the treatment as early in the course of the illness as possible under the conditions already mentioned. If the best results are to be obtained from the drugs used in chemotherapy their limitations must be recognized and they are not to be regarded as a panacea for all acute infections. The drugs are so powerful that the early results seemed to border on the miraculous, but this is no excuse for using them in a casual way: their very potency demands that they be used in the most efficient manner available.

[3] *Bull. N.Y. Acad. Med.*, 1940, **16**, 24.

WAR NEUROSES

The late Dr. T. A. Ross had probably a higher reputation as a psychotherapist than any other doctor in the country, and his book, *The Common Neuroses*, is already a medical classic. In a little book, *Lectures on War Neuroses*,[1] published posthumously, he gives in brief and simple form the fruits of his experience in the last war and since; before he died he had been applying his knowledge to the cases he saw in this war. Ross was a man of independent mind and irreproachable integrity, with no axe to grind. He had learned his methods in a very practical school—the school of his own experience. They were not coloured by any special form of training or adherence to any particular doctrine. It would be a mistake to suppose that he relied only upon personality and common sense, although he had both in uncommon abundance. His methods, as they appear in this book, could certainly be simple; but they were always most systematic and logical, the result primarily of the quality of his own mind and secondarily of his appreciation of the methods of both Dejerine and Freud. They were reinforced by an acute intuitive perception of the foibles of human character, and he did not hesitate to admit that in certain cases his own methods were not enough and had to be supplemented by something as near a psycho-analytical technique as he cared to compass. He reiterates in this book that there is a real difference, not one of degree only, between what is called a "neurosis" and a "psychosis." He found from his experience that on the whole the two conditions behaved very differently from one another in his hands, whether he cured them or not. The onus of proving the opposite rests upon those who, without his therapeutic achievements to their credit and with no

[1] *Lectures on War Neuroses*. By T. A. Ross, M.D., F.R.C.P. London: Edward Arnold and Co. (6s.)

published writings illustrating the use of the "common-sense method" in psychoneuroses in general, claim that this method is as effective as any other.

Ross was not burdened in his efforts by haunting thoughts of constitutional factors. He recognized their existence, as he does again in these lectures; but he was interested mainly in what he could work with and could influence in his patients. He stressed the greater susceptibility of such people to psychological illness, while insisting that what made them fall ill was often faulty upbringing and mistaken handling of personal situations, both of which can be modified by psycho-therapeutic re-education. "Even if he had a bad heredity, that was all the more reason why he should have a good education." There is one point in which Ross's remarkable memory may have deceived him. He records that Weir Mitchell was led to the idea of his rest cure by seeing cases of exhaustion in soldiers of the American Civil War. Osler[2] at any rate gives a different account, citing chapter and verse for the story. He says that Weir Mitchell was prompted to the discovery by despair at not knowing what else to suggest when confronted by a woman patient who had been prescribed everything except rest.

Ross comments adversely on the use of the term "shell shock" and regards "effort syndrome" as a no less unfortunate label for the "D.A.H." of the last war. He understood discipline as a factor in the treatment of neuroses, especially when they are determined by a primitive desire to escape responsibility, as so many war neuroses are. There was a superior officer of Ross's in the last war who remarked that discipline lay in his hands only, and that Ross was wrong in forbidding patients with hysterical fits to go out of hospital to parties. He hints dryly that under this regime the incidence of fits rose again. Nevertheless, Ross was tolerant towards both coward and malingerer. "Cowardice is a military and not a medical category," and, as he said, we have not solved our problems by calling a man a malingerer, but should try to find out why he is one. Having been a family doctor for many years himself, he wanted the family doctor consulted for a previous history of each recruit. On the recruiting board itself a specialist was required, he argued, to assess what should be done, although the specialist could not hope to be one hundred per cent. right. In particular the motive for joining, and especially for seeking a commission, should be ascertained. His third point was that battalion medical officers should look out for signs of strain, and he mentions the findings of the Shell-shock Commission after the last war, which are not sufficiently remembered. The battalion M.O. should take his equal share in the risks and hardships of the men, and commanding officers should recollect that even the best man can be sent too often to a dangerous task. The best psychiatric prophylaxis is done, Ross felt, by the battalion medical officer among the healthy men who are going on with their jobs, and not in special camps behind the lines. He points out something that responsible authorities should remember now: that it is going to be much more difficult to cure war neurotics at the end of the war if return to civil life means return to unemployment. It is a pity that Ross's humanity and skill are lost to us now, except in his writings, and that this little book must be his last.

[2] *Life of Osler*, by Harvey Cushing. Oxford, 1925.

VITAMIN B_1 DEFICIENCY

It has been recognized for many years that the breakdown of pyruvic acid, itself a product of carbohydrate metabolism, is dependent on the presence of a co-carboxylase which has recently been identified as the di-phosphoric ester of aneurin, vitamin B_1.[1] In diseases known to be due to a deficiency of vitamin B_1, such as beriberi and peripheral neuritis, pyruvic acid accumulates in the body fluids (blood and spinal fluid). Methods of estimating pyruvic acid[3] and co-carboxylase[3 4] in the blood have recently been devised and applied to determinations of these substances in the body fluids of children and adults in order to find out how far the amounts may be influenced by various pathological conditions. Wortis, Goodhart, and Bueding[5] examined fifty children in the psychiatric division of the Belle Vue Hospital, New York, who had been admitted on account of conduct disorders, behaviour problems, psychoneuroses, and mental deficiency. None of them showed any of the generally accepted pathological signs of vitamin B_1 deficiency, nor were any of them suffering from any febrile or wasting disease. They came from a low economic stratum of the city's society and might therefore be expected to have received somewhat small amounts of vitamin B_1. The amounts of co-carboxylase found in their blood ranged from 4 to 13 μg., average 7.5 μg., per 100 c.cm. The findings of Goodhart and Sinclair[4] in England of 4.5 to 12.0, average 7.0, μg. per 100 c.cm. for twenty-six adults are very similar to those of the New York findings. Wortis *et al.*[5] also found 0.71 to 1.21, average 0.96, mg. of pyruvic acid per 100 c.cm. of blood and 0.70 to 1.02, average 0.86, mg. per 100 c.cm. of cerebrospinal fluid in thirty-five children. The corresponding figures found in sixty adults were 0.77 to 1.16, average 0.98, mg. in the blood and 0.42 to 1.21, average 0.815, mg. in the cerebrospinal fluid. These workers do not consider that the total amount of bisulphite-binding substances in blood and cerebrospinal fluid can be taken as an indication of vitamin B_1 deficiency. Schlutz and Knott[6] consider that a child's blood should contain 10.0 μg. of co-carboxylase per 100 c.cm. They found that the blood of chronically ill young children (multiple abscesses, severe eczema, prolonged otitis media, and bronchial asthma) contained much less than this. For more acutely ill children the home situation seemed to be a factor determining the co-carboxylase content of the blood. These workers are strongly of the opinion that the level of this factor in the blood may, in general, be maintained equal to that of normal healthy children by careful dieting or by vitamin B_1 therapy.

TREATMENT OF HYPERTENSION BY RENAL EXTRACTS

There is much evidence that the kidney can not only initiate hypertension but can also produce a substance which tends to counteract it. Some observers believe that hypertension depends on the ratio of ischaemic to normal renal tissue. For example, when hypertension is produced in animals by rendering one of the kidneys ischaemic the removal of the other kidney causes a further rise in blood pressure. Experimental injection seems to show that rennin tends to call forth a substance which inhibits its action. Grollman[7] and Page and his co-workers[8] have attempted with some success to extract such an inhibitory substance, and the latter have recently published a report of cases of hypertension treated with renal extracts. When first tested on

[1] *Biochem. J.*, 1939, **33**, 1109.
[2] *J. biol., Chem.*, 1940, **133**, 585.
[3] Ibid., 1940, **135**, 77.
[4] *Biochem. J.*, 1939, **33**, 1099.
[5] *Amer. J. Dis. Child.*, 1941, **61**, 226.
[6] Ibid., 231.
[7] *J. biol. Chem.*, 1940, **134**, 115.
[8] *J. exp. Med.*, 1941, **73**, 7.

dogs or rats previously rendered hypertensive, the extracts produced no immediate fall in blood pressure; in fact there was a sharp rise at first, probably due to the presence of rennin. After two to four days' treatment there was a consistent fall which lasted for several days even if treatment was stopped. Renal insufficiency actually improved with the fall in blood pressure and the condition of the animals also improved so long as the extract was given. In one instance the fall in pressure was from 200 to 130 mm. In human beings the results were similar. After two days' treatment five patients with malignant hypertension, who were previously stuporose, were alert and sitting up in bed. All had retinal changes (two were almost blind), and the vision was partially restored with visible improvement in the appearance of the retina. Radiographs and electrocardiograms showed improvement in the cardiac condition, and in some cases the urea clearance increased. Blood pressures fell, for instance, from 240/150 to 180/110, but rose again when treatment was stopped. Two of the patients died (one had a urea clearance of 5%; the other refused further treatment). In the remaining three the improvement was maintained at the time the paper was written. Patients with essential hypertension of the so-called benign type responded similarly. Headache, when present, disappeared and dyspnoea improved. The fall in blood pressure varied in different patients; in one case a pressure of 229/119 fell to 157/78. The amount of kidney necessary to make the extracts was about one kilogramme or rather less per patient per day. Some general and local reactions occurred, such as pain in the back and a sensation of constriction in the chest, with pyrexia in some cases. These became rarer as more purified extracts were used. It is too early to say that the problem of the treatment of hypertension is nearing solution. The work needs confirmation, and the patients' subsequent progress will have to be carefully studied. This work, however, is more encouraging than anything which has been published for a long time on the treatment of hypertension.

IS THE SAFE PERIOD SAFE?

Is the safe period safe? It has been sponsored from Germany and Japan and blessed by Rome, but even this evidence of a tripartite agreement has failed to allay the many fears that still exist among anxious neutrals. Knaus has accumulated relevant data for many years and claims that its analysis supports his belief that there is a period of infertility in the monthly cycle of a woman. The evidence of physiological experimentation which he offered to support his views has been challenged by many workers, but has been approved recently by no less an authority than Reynolds in his book *The Physiology of the Uterus*. Whatever controversy may centre round the question of this experimental work, the fact remains that Knaus produces evidence that cannot be contested of the efficacy of the safe period when applied in practice. From time to time evidence is offered from other quarters to suggest that the term "safe period" is a misnomer, and as more and more conflicting data are published the general practitioner finds it increasingly difficult to advise his patients on this subject. Recently John Pryde,[1] in a contribution to the study of human fertility, recorded data from two cases in which a total of 576 acts of intercourse without contraception had occurred during calculated safe periods with no resultant pregnancy. In each case the first act during a fertile period was followed by gestation. A clinical study of the problem has also been presented by Stephen Fleak, Elizabeth Snedeker, and John Rock.[2] Their paper was based on the records of the Rhythm Clinic of the Free Hospital for Women in Brookline, Massachusetts. At this clinic patients are supplied with calendars on which they record the dates of menstruation and coitus. On the assumption that the fertile period extends from the nineteenth day before the earliest likely first day of menstruation until the ninth day before the latest likely first day, each calendar has the days of this theoretical fertile period crossed out a month in advance. Every month immediately menstruation ceases the calendars are returned to the clinic, where they are checked and the safe period for the ensuing month is marked. A preliminary selection is made at the patient's first visit to the clinic to exclude those who would be unsuitable for the practice of this method of contraception, and applicants are rejected if there is gross menstrual irregularity or if pregnancy already exists. The authors analyse the records of 207 patients who were accepted. There were twenty-one unwanted pregnancies in this series, but no fewer than fourteen of these occurred when advice given was not carried out, and one followed a mistake in calculating the safe period and may be classified as a "typist's error." The six remaining pregnancies could not be explained. The patients asserted that instructions had been followed in detail, and it is therefore necessary to admit that there is at least a 3% risk of failure, even if all precautions are taken in the application of the method. The conclusion reached was that the safe-period method constituted a workable form of contraception for a selected group of women, but was not reliable enough to be advocated in those cases in which for medical reasons it was essential that pregnancy be avoided. In view of these findings the doctor may with reason be hesitant in advocating the use of the safe period to those of his patients who wish to avoid pregnancy at all costs. On the other hand, he has ample clinical evidence to support him in advising his patients of the fertile period, of which advantage should be taken when sterility exists for no determined reason.

[1] *British Medical Journal*, January 4, 1941.
[2] *New Engl. J. Med.*, December 19, 1940.

We much regret to announce the death of Sir Frederic Still, K.C.V.O., M.D., consulting physician for diseases of children at King's College Hospital, and consulting physician to the Hospital for Sick Children, Great Ormond Street. Sir Frederic had been chairman of the Editorial Committee of the *Archives of Disease in Childhood* from the time of its establishment in 1926 by the Council of the British Medical Association. We also record with regret the death of Major-General Sir William Pike, K.C.M.G., D.S.O., F.R.C.S.I., who was D.M.S. of the Fourth Army in 1917.

The second section of the Birthday Honours List, for members of the Services, includes the promotion of Air Marshal Harold Edward Whittingham, Director-General of the R.A.F. Medical Service, to be K.B.E.

The Royal Medico-Psychological Association will hold its one hundredth annual meeting on Thursday, July 17. The business meeting will be held at 11, Chandos Street, W., at 12 noon, and the afternoon session, during which papers will be read on the subject of "Ear, Nose, and Throat Disease in Mental Disorder," will begin at 2 p.m. at the Barnes Hall, Royal Society of Medicine.

The forty-first annual meeting of the Canadian Tuberculosis Association was held in Toronto on June 6 and 7 in conjunction with the annual meeting of the Ontario Laennec Society, and it was followed by a meeting of the American Association of Thoracic Surgeons.

CHEST SURGERY IN WAR

This is one of a short series of articles based on lectures given at the British Postgraduate Medical School, Hammersmith

CLOSED WOUNDS OF THE CHEST, AND THE PHYSICIAN'S PLACE IN A CHEST TEAM*

BY

J. A. NIXON, C.M.G., M.D., F.R.C.P.

Intrathoracic Injuries

We may now pass to a consideration of the intrathoracic injuries pure and simple. The distress caused by an open thorax is usually very great, and until the opening has been closed it is difficult to estimate the extent to which the symptoms are due to injury of the thoracic contents. Auscultation and percussion will add little or nothing to the information obtained by seeing the hole in the chest wall. Active haemorrhage may be visible externally and be recognizable by the colour of the blood, which continues bright and arterial. The leakage of a haemothorax which is not increasing from fresh haemorrhage is usually darker and resembles venous bleeding; moreover, the blood does not clot outside the body as fresh blood does. Injuries to the thoracic duct cause rapid and uncontrollable wasting. With closed thorax the examination of the chest resolves itself into a combination of the ordinary methods (inspection, palpation, percussion, and auscultation) with radioscopy and radiography.

Inspection.—The presence of surgical emphysema almost always means the presence of either partial or complete pneumothorax. If the heart's apex beat is visible an alteration of its position may depend on the heart's being pushed over by air or fluid, or on its being pulled over by collapsed lung. Visible distension of one side of the chest may depend on air or fluid. An overdistended chest will generally be immobile. The degree of movement in a chest is not, however, always proportionate to the intrathoracic injury. On the one hand there may be, for instance, a considerable amplitude of respiratory movement with a large haemothorax if the lung remains partly expanded; and, on the other hand, a chest which has been struck without material intrathoracic damage may remain immobile for two or three days even though the lung is not collapsed, and even in the absence of haemothorax or pneumothorax. Cases of this kind are seen in which the injured side remains resonant, slightly retracted, without inspiratory or expiratory sounds, but with normal vocal fremitus and normal radiographic appearance. This condition persists for one or two days and recovers completely. In cases of collapsed lung (without haemothorax or pneumothorax) the side may appear greatly retracted, with indrawing of the interspaces on inspiration.

Palpation.—Surgical emphysema is the first sign to be felt for. If extensive it obliterates or distorts every other physical sign except the position of the heart. Displacement of the heart may be determined by palpation. Exocardial friction fremitus may be felt. It does not always indicate haemo-pneumopericardium or pericarditis: substernal surgical emphysema may cause a similar friction fremitus. Fractured ribs or a missile lying under the skin may be discovered by palpation. An ecchymosis on the chest wall should be carefully palpated, as it is often due to a missile which has penetrated as far as the skin without making its exit. Tactile vocal fremitus is not always diminished and is occasionally increased over haemothorax. It is not even invariably lost over pneumothorax. The value of palpation can scarcely be overemphasized.

Percussion.—Percussion is apt to be misleading when the chest has been injured. The resonance of the normal chest depends to some extent on the tension of the chest wall, in the same way as the resonance of a drum depends on the tension of the drum-head. If the chest wall becomes abnormally lax (as when ribs are extensively smashed) the resonance and the pitch of the percussion note are thereby altered. Surgical emphysema will yield a resonant note even over a large haemothorax. Resonance may be impaired over a collapsed lung even if there is no haemothorax. The level of dullness does not indicate the size of a haemothorax. Alteration in the position of the mediastinum may be detected by percussing out the anterior limits of resonance of the uninjured lung. The position or size of the cardiac dullness may be found changed. The liver dullness or stomach resonance is sometimes found to rise unduly high in chest wounds owing to relaxation or paralysis of an apparently uninjured diaphragm. This may mean that the diaphragm is paralysed or that the lung above it is collapsed. Particular attention should be paid to percussion of the base of the opposite (and apparently uninjured) lung. Abnormal dullness of this base may be due to an abnormally high diaphragm, to consolidation, collapse, or compression of the lung, or to a haemothorax. A missile may have passed through both lungs. The diaphragm may be pushed up by subphrenic injuries or by tympanites and cause abnormal dullness at the pulmonary base or bases.

Auscultation.—The positive sign of good air entry with normal vesicular breathing is the most valuable of all auscultatory sounds. It is evidence that the lung in that area is expanding. Absent and altered breath sounds are less reliable. Breath sounds may be diminished or totally absent in haemothorax and pneumothorax; they may be equally absent in any case in which the lung is not expanding—for example, when a bronchus is blocked or when the respiratory movements are too feeble (as in shock) to produce any audible sound. Altered breath sounds do not follow the same general rules in injuries as in diseases of the lungs. Bronchial breathing is not uncommon over haemothorax, whilst it may be absent in haematoma of the lung if the haematoma is superficial and wide in extent. Bronchial or amphoric breathing is often heard over pneumothorax even when closed. The coin sound is sometimes absent even in a large pneumothorax.

Mucous and Crepitant Rales.—It is very difficult to assign particular values to mucous rales and crepitations in the same way as has hitherto been customary in disease. When it is remembered that, in the majority of cases where the lung has been struck, three changes almost invariably occur which are capable of producing mucous or crepitant rales, the difficulties of exactly interpreting these physical signs will be appreciated. The three constant changes are collapse of air vesicles, haemorrhage into the alveoli and bronchioles, and haematoma of the lung. Whatever other accidents may have occurred these three may be confidently assumed to be present when a missile has struck the chest with enough force to penetrate

* Concluded from page 976

its wall. Mucous rales will give practically no information of diagnostic value. Crepitations are occasionally useful, particularly in two conditions. In collapse of the lung (either homolateral or contralateral) widespread coarse dry crackling is a valuable physical sign. In compression of the opposite lung by a large haemothorax or pneumothorax on the injured side fine crepitations are often heard over the base of the compressed lung. On the second or third day (and at any later time) the appearance of crepitations where none were previously heard may indicate the occurrence of pneumonia or bronchopneumonia, or that extremely rare condition gas gangrene of the pulmonary tissue.

Friction Sounds.—Pleural friction must be carefully watched for. It is often the first sign of intrathoracic infection. But a small haemothorax almost always at an early stage produces friction which is of no great moment. Pericardial friction is not uncommon, but pericarditis is not necessarily a fatal or even a serious complication of gunshot wounds of the chest. A heart beating in surgical emphysema of the substernal tissues may give rise to a friction sound indistinguishable from pericarditis or to a remarkable churning sound mistakable for haemo-pneumopericardium. An adjacent pneumothorax will give to the normal heart sound an exaggerated resonance or reverberation, and if friction is present either from pericarditis or surgical emphysema, or from haemopneumopericardium, the noises which may result are astonishing, although with experience they become unmistakable. As a rule the exocardial friction sounds which appear immediately after wounding are due to surgical emphysema, and are very loud and coarse. They begin faintly over a limited area and spread gradually with increasing loudness. Hernia of the stomach or intestines may cause gurgling sounds to be heard in the chest, but these sounds are not diagnostic of a lacerated diaphragm. Intestinal gurgling is sometimes transmitted very distinctly through a pneumothorax when the diaphragm is intact, and it is also heard when the diaphragm is raised abnormally high. It is very difficult to interpret changes in the heart sounds and rhythm correctly. Bruits which are mistaken for endocardial murmurs are produced by displacement of the mediastinum with dislocation or torsion of the heart and great vessels. Irregularities in rhythm may be similarly caused. Speaking generally, a heart which has been hit, with or without penetration, takes on a rapid and irregular action, especially if struck on the posterior aspect or near the auriculo-ventricular junction. I have, however, seen in one case a shrapnel ball lodged in the ventricular muscle near the apex, and in another a fistulous opening through the chest wall into the right auricle, yet in neither was there any interference with the heart's action. But as a rule true delirium cordis indicates that the heart has been struck by the missile. Physical signs suggesting involvement of the pericardium or heart do not constitute a contraindication to operation. They are exceedingly fallacious.

Succussion Splash.—It may be possible to elicit this sign in haemo-pneumothorax. It is never justifiable to attempt to do so in the early stages, and with *x* rays at hand it is never necessary.

Metallic Tinkling.—I thought that I had never met with this sign in gunshot wounds of the chest, but recently I found a note of it in one of my cases at Heilly (in 1916).

Voice Sounds.—Modifications of vocal resonance are apt to be misleading. The most constant and reliable sign is aegophony, which I have not met with except when there was fluid in the chest. It is usually best heard at or near the upper level of the fluid, and may be localized to a very restricted area there. Diminished vocal resonance does not always accompany even a large haemothorax; it may be considerably increased. Occasionally the vocal resonance is increased without any obvious intrathoracic change even on *x*-ray examination. I do not know what is the explanation of this sign occurring in a chest which has been hit or penetrated. I have often met with it in the first few hours, and have not been able to attach any importance or diagnostic significance to it. Possibly it is due to a partial deflation of the lung that is not sufficient to produce the physical signs of collapse. In pneumothorax the voice sounds and the cough may acquire a characteristic metallic ring. This metallic ring is also sometimes heard with the inspiratory souffle in a closed pneumothorax, and indicates that a large opening communicates with the pneumothorax from the bronchus.

Auscultation is made very difficult when surgical emphysema is present. If the surgical emphysema is considerable and obvious, it will be recognized at once that auscultation can be of little assistance. Often, however, the emphysema is not evident, and the auscultatory sounds become very puzzling, particularly when the surgical emphysema is mediastinal, substernal, or subpleural, and does not extend to the subcutaneous tissues. Under all circumstances auscultation should reveal the approximate position of the heart, and this is a point which requires to be determined in every case of gunshot wound of the chest.

Value of Radiography

It is impossible to treat chest wounds adequately without radiographs. From the time a case comes within reach of surgical assistance to the time the patient is finally discharged as cured, and even long after if untoward sequelae are suspected, radiographs are constantly required. At the outset it is only with radiographs that the probable track of a missile and its position, if retained, can be ascertained. The position of the heart and diaphragm, their movements, damage to the lung, collapse of the lung, haemothorax, and pneumothorax can only be accurately determined by radiographs interpreted in conjunction with physical signs. Radiography alone is insufficient; the cases must also be radioscopically examined and the parts be seen in movement with the fluoroscopic screen, in a sitting-up position if possible. It must be remembered that pieces of clothing can never, and fragments of bone only rarely, be revealed by radiographs.

Some Other Considerations

One of the most reliable signs of a haemothorax becoming septic is an increased respiration rate and even apparent dyspnoea without any corresponding change in physical signs or increase in the amount of fluid. Air in the pleural cavity plays little or no part in preventing a collapsed lung from expanding unless there is a valve pneumothorax constantly pumping air into the pleural cavity. The rapidity with which a collapsed lung can re-expand if free from adhesions is not generally known. I had accidental proof of this during the last war. A patient on whom complete thoracotomy had been performed was by mistake radiographed within two hours of his operation. The lung, which had been fully collapsed at the operation, was found both by screening and by a photographic plate to be almost completely re-expanded. The thoracic wound had been hermetically closed and covered with glue.

"Pleural shock" is a terror to some minds. But the pleura is not a delicately sensitive membrane. Opening the pleural cavity and handling the lung can be done with impunity if care is exercised not to allow displacement of the mediastinum and contents.

If the mediastinal contents are gently held in place with tenaculum forceps a patient under local anaesthesia experiences very little discomfort and no shock when the thorax is opened, the cavity explored with the hand, and the lung even "delivered" outside the chest for examination and repair. If, however, the heart is allowed to swing out of position grave shock may occur immediately. I have seen a patient whose heart was pinned in position by a small fragment of metal which attached the pericardium to the diaphragm almost die on the operating table when the heart was released and allowed to swing to the opposite side of the chest, although a total pneumothorax had caused him little discomfort either at the time of wounding or after the thorax had been widely opened at the beginning of the operation. It is very striking to find how little is the distress caused by sudden pneumothorax when the heart is retained in position by old adhesions. In 1921 I saw an example of this in a soldier who was wounded in 1915: his pneumothorax, dating from that time, was discovered only by accident in 1921. His heart was held in position by adhesions which were probably present before he was wounded. In cases showing extreme distress relief is instantaneous when, after opening the chest for thoracotomy, the heart is gently drawn back into position.

The heart is a strange organ. It appears to resent blows on its posterior aspect more than on the anterior; it also resents anything like torsion during an operation. If the heart impinges on a foreign body during its beating the rhythm and rate may be totally disordered even when the heart itself is quite uninjured. Never diagnose haemopneumopericardium until you have seen the pericardium exposed either during life or after death.

Breathing exercises are apt to be overvalued. With a well-cleaned pleural cavity a lung expands perfectly without exercises. The toilet of the pleura is what matters. Lockwood and I eventually abandoned exercises altogether, as they only fatigued the patient uselessly. Mr. Tudor Edwards in his memorandum E.M.S. Gen./326 says he is doubtful if blowing exercises have the slightest value in the re-expansion of a lung bound down by pleural adhesions. I have often demonstrated what happens radioscopically. The good lung overdistends, the mediastinum bends convexly into the damaged side, and the harder the patient blows the greater is the mediastinal displacement.

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The thirty-fourth annual medical report of the King Edward VII Sanatorium, Midhurst, is almost entirely statistical. It analyses the admissions and discharges (142 and 172 respectively) of the past year and also the after-history of the Midhurst cases since 1906. Of the 149 patients discharged in the first year of the sanatorium's existence, 27 were still alive in 1940. The more astonishing thing is how few are lost sight of—something under 5%. The treatments given are also analysed; thus during the last fifteen years artificial pneumothorax has been attempted in 303 cases, and has been successful in 240. Of these 240 patients, some of them dating back to 1925, 182 (or 76%) are known to be still living. Eighteen patients out of 15 severe cases and 23 less severe in which thoracoplasty was done were known to be working or fit for work, 6 to be well though not working, and 5 to be keeping in fair health. On the outbreak of the war, half the sanatorium was taken over by the Ministry of Health for the treatment of surgical chest cases among the officers of the three Services. These cases are not discussed in the present report, but it is proposed at the end of hostilities, or earlier if the number of cases requires it, to give a full analysis of the cases treated.

THE PREPARATION AND COOKING OF GREEN VEGETABLES

The following note on the preservation of the vitamins and salts in the processes of preparing green vegetables for the table has been drawn up by the Medical Research Council's Accessory Food Factors Committee.

Conservation of Vitamins

Vitamins are lost or destroyed in the preparation and cooking of greenstuffs by many of the methods now in common use. As it is of special importance at the present time to secure the maximum nutritive value from all the foods available, it is desirable to employ methods of preparation and cooking of foodstuffs which conserve their nutrients to the utmost.

The following generalizations summarize our knowledge of the behaviour in greenstuffs of the vitamins most likely to be affected in the course of preparing green vegetables for the table. Some simple rules based on these generalizations are given and cooking methods for greenstuffs are recommended.

Fat-soluble vitamin A is unlikely to suffer damage; water-soluble vitamins B and C are the most likely to be lost on preparation and cooking. This is so for the following reasons:

(i) Because they are water-soluble, they are dissolved out by soaking or cooking water, they also run out in the watery juice.

(ii) Raw vegetables contain enzymes which are active in destroying the vitamins, particularly if the raw foodstuff is left lying about after being bruised or cut up. These substances which destroy the vitamins become more active as the temperature rises during cooking up to a point at which they themselves are destroyed. This point of destruction is only a few degrees below boiling temperature.

(iii) The water-soluble vitamins are themselves also destroyed by heat to an extent which depends on the length and severity of the heating.

(iv) The water-soluble vitamins are found to diminish in amount in foods left standing after they are cooked.

(v) Salt or sugar added to vegetables before cooking lessens the amount of destruction under conditions described in (iii) and (iv) above.

(vi) Vitamins B and C are more stable in the presence of acid, which is sometimes added as vinegar. The addition of alkali (carbonate or bicarbonate of soda) will, on the other hand, hasten the destruction of the vitamins.

Practical Rules for treating Green Vegetables

(1) Obtain as fresh as possible.

(2) Keep in a cool damp place in order to reduce wilting.

(3) Take precautions to avoid damage due to crushing or bruising during transport or handling.

(4) If vegetables are soaked use salt water (two teaspoonfuls to one pint).

(5) If vegetables are to be shredded or finely chopped for salads, prepare immediately before serving.

(6) Use the smallest possible amount of water for cooking.

(7) Have water boiling before adding vegetables.

(8) Add salt to water before adding vegetables.

(9) Add vegetables gradually or in small amounts at a time, in order to prevent water going off the boil.

(10) Cook vegetables no longer than is necessary to render them tender.

(11) Plan cooking arrangements so that vegetables are dished up and served immediately after they are cooked. On no account allow to stand for a long time on a hotplate.

(12) If there is water left after cooking, drain off and use in the preparation of soups and gravies; alternatively, if successive batches are being cooked on the same day, use the same water again, adding more if necessary

Methods resulting in Least Loss of Vitamin C

Method I.—Boil for the shortest time in a small quantity of boiling salted water. Use water left over for boiling other batches and for addition to soups and gravies.

Method II.—Slice the fresh vegetables into ribbons about 2 to 3 inches long by 3/4 inch wide and cook briskly for half to one minute in a small quantity of hot oil or dripping to which salt has been added (two teaspoonfuls oil and half teaspoonful salt to an average-sized cabbage). Add a small quantity of boiling water (half to one cupful for above) and stew for about ten minutes in a closed container. Keep the lid on so that no steam escapes. When the vegetables are cooked only a very little water should be left. This method is used throughout the Far East and India. In Europe the nearest approach to it is the French method of "casserole" or "conservative" cooking, by which the vegetables are placed in a closed fireproof dish with a little water and fat and cooked in the oven or over a low flame for 15 to 25 minutes.

In hay-box cookery vitamin C is destroyed, so that this method should not generally be used for cooking green vegetables, which are particularly valuable in the diet for their vitamin C content.

Steaming of vegetables even with the best equipment is not as satisfactory as the methods described above.

Conservation of Salts

If the precautions described above are carefully taken, it can be relied on that effective conservation of the valuable salts present in green vegetables will also be secured.

INVALIDS, AND BREAD FORTIFIED WITH CALCIUM

The following statement concerning the effect upon invalids of bread made from flour "fortified" by the addition of calcium salts has been issued by the Medical Research Council:

The exigencies of the present situation have forced upon the people of the country a diet which requires, if health is to be maintained, the addition of a supplement of calcium salts. The need for this supplement is brought about in two main ways: (1) the wartime diet tends to be deficient in available calcium, especially since restrictions have been imposed upon the sale of milk and eggs; (2) the high content of cereal foods in the diet increases the amount of calcium it is necessary to ingest; this is partly because most cereals are deficient in calcium but also because the presence of phytic acid in cereals often prevents the body from making use of the calcium they contain. The Ministry of Food has asked the Food Rationing (Special Diets) Advisory Committee whether the addition of small supplements of calcium salts to flour would be in any way deleterious to invalids. In reply the committee expressed the opinion that "there is neither medical nor scientific evidence that the consumption of bread made from flour fortified by the addition of appropriate quantities of calcium salts is harmful to patients suffering from any type of disease." This opinion was based on the following considerations.

It has been proposed by the Accessory Food Factors Committee of the Lister Institute and of the Medical Research Council that 14 oz. of calcium carbonate be added to each 280 lb. of 85% extracted flour and 7 oz. of calcium carbonate to each 280 lb. of white flour. Expressing these quantities in other terms, it can be said that 1 lb. of the "fortified" 85% extracted flour and 2 lb. of the "fortified" white flour contain slightly less calcium than 1 pint of fresh milk. There can therefore be no objection to the use of this fortified flour on the grounds that it will result in the consumption by invalids of harmful amounts of calcium. It is, however, necessary to dispel a current misconception with regard to the qualitative aspect of this fortification. It has been suggested that the consumption of fortified flour might have a deleterious effect upon certain invalids, not because of the increased calcium content, but because the calcium added to it is in a form—the carbonate of calcium—different from that which exists naturally in food and that this carbonate of calcium is harmful.

This criticism appears to be ill founded. There is direct evidence obtained on human beings that the calcium of calcium carbonate is as available to the body as that of calcium phosphate. In an easily assimilable food, such as milk, calcium is in the form of a combination with a phosphoric acid, a common normal component of animal tissues; in calcium carbonate, calcium is also present as the salt of an acid of widespread occurrence in living tissues. In both cases the calcium is split off from the acid during the process of digestion and is absorbed into the body in the same form in each case.

A CORPS SCHOOL FOR THE R.A.M.C.

[FROM A CORRESPONDENT]

For intensiveness it would be hard to beat a week's course which an enthusiastic class from No. 2 Corps R.A.M.C. has recently undertaken in a university town. Thanks to the co-operation of one of the colleges, about 30 R.A.M.C. officers and N.C.O.s have been accommodated in its rooms, the undergraduates being down for the vacation. It was never pretended that more could be done in a week's course than open up and draw attention to a number of subjects which officers should study.

This is not a question of medical subjects pure and simple. The trained R.A.M.C. officer is much more than a medical man in khaki, his patients the men in the Army; he is in his degree a military expert, with a sufficient knowledge of modern methods of fighting, the use of different types of weapons, the technique of supply and transport, and a hundred other matters to make him a well-adapted unit in the many-sided organization of which he is a part. He should be able to read maps, should be trained in drill, should have acquired a soldierly carriage and demeanour, and should have a note of authority in his voice, without which he cannot expect to command obedience, especially when circumstances are trying and danger is imminent.

Therefore, although there were lectures in this course on such subjects as surgery in the field, wound shock, and sanitation, there were lectures also bearing the titles "Signals," "The Armoured Division," "Administration," "Security," "Supplies." Such themes as messing and cooking and office routine were not neglected.

Each of the six mornings of the course began with a short spell of physical drill under the leadership of an instructor. The rest of the morning was given up to four lectures, each lasting some forty minutes, with opportunities for questions at the end. These were given by R.A.M.C. officers of experience and staff officers who had obviously taken great pains to prepare their material. After lunch in the college hall the class had an hour of squad drill, stretcher work, or Thomas's splint drill; then came two more lectures, and after tea the class met in syndicates to discuss problems set by the D.D.M.S. of the Corps in an indoor "tactical exercise without troops." Then mess in hall, and still another lecture, perhaps on a wider or more "popular" subject

A Specimen Day in the Course

Take a specimen day—the Thursday of the course. After physical training the four morning lectures are on "Fire Signals," by a Fire Officer; "Military Law," by the Commandant; "Routes and Convoys," by the M.A.C. Officer; and "The Field Ambulance," by the A.D.M.S. of the Division. In the afternoon squad drill and triangular bandages, and then two lectures, one of them on "Flies and Vermin," by the officer commanding the Field Hygiene Section. In the evening, instead of a popular lecture, solutions are given by the D.D.M.S. to the problems set in the tactical exercises. This is one of the most instructive events of the week, and a vivid picture is built up of the details with which medical officers should be familiar in battle. Medical tactics are discussed and points emphasized by question and answer in a two-hour session.

This Corps School is the direct descendant of the No. 6 Corps School which was started in 1916 by Major-General Sir Harry Thompson and continued in the following year as the First Army R.A.M.C. School of Instruction (B.E.F.). The syllabus is much the same and the general policy identical. The chief instructor and late Commandant of the old Army School is now D.D.M.S. of the Corps. The Commandant is an R.A.M.C. officer with recent war experience, and the Adjutant did good work as a regimental medical officer in Flanders last year. During the week's course these officers were accessible at all times to answer questions and explain any points that had arisen out of the day's lectures, and this was perhaps even more useful than the set programme.

On the last morning, after a lecture on physical medicine by the Commandant, the course ended with a demonstration of the carrying of casualties and a visit from the Corps Commander, whose personal interest in the work of the R.A.M.C. has been at all times most stimulating. Later arrangements included a class lasting one week for N.C.O.s, and a short study week for senior R.A.M.C. officers.

AWARDS FOR GALLANTRY IN CIVIL DEFENCE

The award of the George Medal to Dr. Hannah Billig, Stepney, to Dr. Bernard Doyle, and to Mr. S. Woolfson, District A.R.P. Warden, Stepney, and to Dr. Allison Jean McNairn, assistant medical officer, City General Hospital, Plymouth, is announced in a *Supplement* to the *London Gazette* dated June 27. The announcements read as follows:

Dr. BILLIG: "During an air raid Dr. Billig, although herself injured, left shelter to attend to casualties in the street. Bombs dropped within twenty yards of her, but for four hours she continued to give treatment to the injured. She showed great bravery and attention to duty, regardless of her personal safety and injuries."

Dr. DOYLE and Mr. WOOLFSON: "During a severe air raid a large building was hit and caught fire. Dr. Doyle and District Warden Woolfson entered that part of the building which was alight and wrecked and found two men trapped. Two high-explosive bombs which rocked the blazing building dropped within twenty yards of the rescuers, but they continued their rescue work and both victims were removed to safety. More high-explosive bombs fell nearby and two men of the rescue party were buried. One of these man was quickly removed, but the other was pinned down by half a ton of masonry. Dr. Doyle was again called to give treatment, and whilst so doing more bombs were dropped, but in spite of this Dr. Doyle stayed with the casualty until he was removed to hospital. Woolfson remained at the scene of the incident the whole of the time aiding the rescue work, and did not leave until all casualties had been removed from the building. Both men showed great courage in very dangerous circumstances."

Dr. MCNAIRN: "When the hospital was hit Dr. McNairn was buried to the neck in debris. She was extricated, and despite shock and injuries, assisted in the rescue work and gave medical assistance to injured patients and air-raid casualties admitted to the hospital. She would not have treatment for her own injuries until all other cases were being cared for, but despite severe pain continued to give aid."

NATIONAL BABY WEEK

The twenty-fifth National Baby Week opened on Tuesday, July 1, and messages of encouragement have been received by the National Baby Welfare Council from its Patron, Queen Mary, from the Minister of Health, and from Sir Wilson Jameson, Chief Medical Officer to the Ministry of Health. The function of the Council (whose offices are at 29, Gordon Square, W.C.1) is to educate public opinion on matters connected with the welfare of mothers, babies, and little children. Queen Mary writes: "I am sorry that the jubilee celebration of the twenty-fifth National Baby Week should have fallen in time of war. Nevertheless I am glad to have this opportunity of paying a warm tribute to what has been achieved by the National Baby Welfare Council during the past 25 years. I know that the Council are now doing their utmost in helping to solve the many new and urgent problems in the care and well-being of mothers and small children arising out of the difficulties and tragedies of wartime conditions. To one and all who are striving in this vital cause I send my congratulations upon this jubilee anniversary and my best wishes for continued success in the years to come." The July, 1941, issue of *Mother and Child*, official organ of the National Council for Maternity and Child Welfare (Aldwych House, Aldwych, W.C.2), is a special Baby Week Number. It includes a commemorative editorial by Dr. Eric Pritchard, chairman of the executive committee 1917-39 (who also writes on milk dilutions and deficiency symptoms), a paper by Dr. Leslie Housden on the relation of mothercraft teaching to family allowances, and a record of progress in the campaign for immunization of children against diphtheria.

There will be no more "white bread" available in the Union of South Africa for a long time. The Union has had to import so-called "hard wheat" from Canada to make up for the deficiency in the grade of home-produced wheat for bread-making, and the wheat cannot now be imported owing to the requirements of shipping for war purposes. The Government has therefore decided to introduce a standard loaf in which only whole wheat is used. Dietitians maintain that this bread is more nutritious than white bread or the brown variety made of unsifted flour.

Local News

ENGLAND AND WALES

Epsom College

The President, Lord Leverhulme, took the chair at the eighty-eighth annual general meeting of Epsom College, held on June 20, at 49, Bedford Square, London, W.C. In moving the adoption of the Council's report he congratulated the headmaster and his staff, the secretary and bursar and those associated with him, on the way in which the work of the school and the Foundation had been maintained. He pointed out that some public schools had necessarily had to be evacuated to quieter parts of the country, and thought that the present generation of Epsomians in passing through the school would count themselves fortunate in future years that their public-school lives were passed amid surroundings familiar to all old Epsomians. The President expressed the Governors' deep gratitude to Dr. John Fawcett for his services during the past six years as treasurer. In proposing as his successor Surgeon Vice-Admiral Sir Reginald Bond, he said that it was fitting that the College should have a distinguished member of the Senior Service in this office now. The Governors unanimously adopted the Council's Report and received the announcement of foundation scholarships and pensions awarded by the conjoint committee which met in May last.

IRELAND

Medical Research Council of Ireland

The Medical Research Council of Ireland, of which Prof. R. P. Farnan is chairman and Prof. J. W. Bigger honorary secretary, states in its fourth annual report that during 1940 the policy was followed of continuing as far as seemed wise and feasible the support of workers already appointed, and not many fresh appointments were made. Such a policy, of course, risks discouraging research workers who might under favourable conditions be assisted and developed, but as experience in research is gained only slowly and with difficulty it is considered that it would be unwise to sacrifice what has already been achieved. The necessity for encouraging research workers is emphasized. In a country like Ireland the reputation of the medical profession outside its boundaries depends very largely on the research work done by its members, and the value of an improved reputation of the Irish medical profession alike to the progress of the State and to the Irish doctors who have to seek work abroad is self-evident. The hope is expressed that when the Council again approaches the Minister for Local Government and Public Health (as it did in 1938) it will be found that the Government and the community realize the importance and worth of its activities, and that it will be possible for the Minister to place an adequate capital sum at its disposal, or at least a larger income and for a longer term of years than the £5,000 a year for five years which is at present granted. New grants were made during 1940 to three whole-time and two part-time workers, as well as five grants-in-aid, and grants were renewed to five whole-time and four part-time workers. Special attention is drawn to the work done by one grantee, Dr. R. A. Q. O'Meara, on diphtheria antitoxin. This work was initiated on account of the high death rate from diphtheria in Dublin. From Dr. O'Meara's work it was concluded that diphtheria toxin has two components, which he has named substances A and B, and that the type of toxin responsible for hypertoxic diphtheria is that in which a high proportion of substance B relative to substance A is found. During 1940 a limited amount of antitoxin rich in antibody to substance B became available for clinical trial at Cork Street Fever Hospital, Dublin, and of sixteen cases of infection with the *gravis* type of organism so treated, the cases being chosen because of their extreme severity, only one died. The dose of this antitoxin found to be effective clinically is only from one-third to one-eighth that of a commercial antitoxin.

Belfast Tuberculosis Scheme

It was announced on June 16 by the Ministry of Home Affairs for Northern Ireland that the Belfast City Council had been relieved of its powers under the Tuberculosis Pre-

vention (Ireland) Act, 1908; that its Tuberculosis Committee had been dissolved; and that two commissioners had been appointed to take control. These steps followed an inquiry by Mr. J. Dunlop and Dr. E. Armstrong into the administration of Whiteabbey Sanatorium and Graymount School. The Ministry found that the medical superintendent officer of health, Dr. C. S. Thomson, was deserving of censure; that the city treasurer, the steward clerk, and Sister S. J. W. Houston were deserving of severe censure; that Dr. P. S. Walker, the medical superintendent, and Miss J. M. Lamb, the matron, should be retired from their respective offices; and that the official stocktakers should not be re-employed. As a result of the action of the Ministry in dissolving the Tuberculosis Committee of the City Council, the Belfast Corporation on June 20 appointed six members to investigate the various municipal departments, and the Lord Mayor announced that Dr. Walker, whose retirement had been ordered by the Ministry, had resigned his post owing to ill-health.

Correspondence

Crush Injuries

SIR,—In the article on "Crush Injury with Impairment of Renal Function" (March 22, p. 427), Dr. D. Beall and I stated that we had been unable to find any account of similar cases in the literature. This surprised us, since such injuries are not uncommon in any war conducted along modern lines; in certain civil occupations (e.g. mining) similar damage seems also possible. We have since discovered references to it by a more thorough search of the German literature.

The first description is that of Colmers (1909), who described among 83 casualties from the Messina earthquake 19 suffering from "acute pressure necrosis." Unfortunately, the German expedition arrived on the scene fourteen days after the accident, when all the acute cases had died, and in only one case is there a history of bloody urine and oliguria.

Then, in 1916, Frankenthal described three soldiers who had been buried and showed oedema, bloody urine, and, post mortem, ischaemic muscle necrosis. Little attention was paid, however, to the kidneys. Other pathologists then described similar material, many in journals now inaccessible or in "inaugural dissertations." Among these, Hackradt (1917) from Borst's laboratory described tissue from a nine-hour burial with oedema of the leg, and blisters, and bloody urine containing albumin and casts, the patient dying on the fifth day. Necropsy showed muscle necrosis and tubular degeneration in the kidneys with blood casts. Bredauer later (1920), from the same laboratory, described three further cases.

It was left to Minami in 1923 to summarize the chaotic literature and to investigate more completely material from three cases that had been already briefly described by Lewin (1919) from Pick's laboratory. His description,[1] though incomplete, tallies exactly with our own—e.g., Case II, buried by a grenade explosion for an unknown time, on the second day showed a painful swelling of the left thigh; on the fourth day scanty bloody urine and tenderness in the kidney region; on the fifth day 200 c.cm. of urine only, less pigmented, was found; and on the sixth day, when death occurred, the urine was still scanty (but now yellow) and contained red cells and hyaline casts. Necropsy showed grey muscle necrosis and oedema of the lungs. The kidney showed normal glomeruli, degeneration of the convoluted tubules, and pigmented masses and ribbons in the collecting tubules and in Henle's loops. Minami also pointed to the analogy with paralytic myohaemoglobinuria of horses, intending, if he could obtain fresh material, to identify the pigment spectroscopically.

By the end of the last war the syndrome was well recognized by Germans, and included in the textbooks of war surgery; in Great Britain, however, it appears to have been both unrecognized and undescribed; nor have I discovered any reference to the German findings. In six of the standard textbooks on war surgery published here and in the U.S.A. there is no mention of it, nor is there in the (yet) few books on that subject published here recently.

Examination of the reasons for this gap in our medical preparedness is almost as important as the finding thereof.

First, while we were not, as the Germans were, fighting on fronts contiguous with our own system of hospitals, yet we had an efficient pathological service working in France. This developed most highly, however, the bacteriological aspects; the enemy, steeped in the Teutonic tradition of morbid anatomy, not only had his crushed and buried patients dying on German-occupied soil instead of at a French base or in mid-Channel, but had the energy to investigate such material. We should be able to learn a great deal from the systematic examination of such traumatic deaths, which, until the war, had tended towards the perfunctory. Necropsy should be done on air-raid victims whenever possible.

Secondly, the surgeon under wartime conditions is often too busy to give detailed consideration to anything beyond what is absolutely necessary to the well-being of the patient. This is where co-operation between surgeons, physicians, and research workers becomes of the utmost importance: clinical, chemical, and pathological observations adequate enough to make any rational deductions regarding treatment are in many of these conditions far beyond the capabilities of any single, even full-time, worker. The advantages of group research are thus obvious.

Finally, German medicine can never be entirely ignored by us without loss, even though, since the advent of Nazism, its general standard has been in rapid decline.—I am, etc.,

Department of Medicine, British Postgraduate Medical School, June 27. E. G. L. BYWATERS.

REFERENCE

1 Minami. *Virchows Arch.*, 1923, **245**, 247. The other references are given in this paper.

Sulphadiazine and Sulphanilyl-guanidine against Gas Gangrene

SIR,—Some months ago (*Journal*, 1941, **1**, 263) you kindly published a paper by myself describing experiments on the use of sulphonamide compounds to prevent infections by gas-gangrene organisms in experimental wounds of guinea-pigs. This work showed that the local application of these compounds would prevent fatal infection by *Cl. welchii* or *Cl. septique* in a large proportion of cases; of the three main sulphonamide compounds now in use, sulphanilamide, sulphapyridine, and sulphathiazole, the last named was the most effective. Since this paper was written, two new compounds have been introduced in America—namely, sulphanilyl-guanidine and sulphadiazine. An investigation has therefore been made to discover whether either of these exerted any greater effect than the three just mentioned. The technique was identical with that previously used. With *Cl. welchii*, six experiments were made using five different strains; generally the infecting dose of organisms was greater than 1,000 M.L.D. All the controls died, mostly in the first twenty-four hours. In the group treated with sulphathiazole, 26 out of 36 (i.e., 72%) survived for more than ten days; in the group with sulphadiazine 13 out of 30 (i.e., 43%) survived; in the group with sulphanilyl-guanidine 14 out of 33 (i.e., 42%) survived. The virulence of the infection varied a good deal from one experiment to another, so that these totals require a little qualification.

Briefly, in all the experiments the guinea-pigs treated with sulphanilyl-guanidine were definitely worse than those with sulphathiazole as regards both survival rate and clinical condition. Five experiments were made with sulphadiazine; in three experiments sulphadiazine appeared as effective as sulphathiazole, but never more effective, while in two experiments it was markedly inferior. With *Cl. septique* two experiments were made, one with over 10,000 M.L.D. and one with less than 1,000 M.L.D. Sulphadiazine appeared to be about as effective as sulphathiazole, while sulphanilyl-guanidine was inferior on both occasions. From these experiments it is concluded that sulphanilyl-guanidine is definitely inferior to sulphathiazole in protecting animals against *Cl. welchii* or *Cl. septique*, while sulphadiazine is no better than sulphathiazole and is probably inferior. This work provided no evidence that it would be advantageous to substitute either of these compounds for sulphathiazole as a local application to wounds.

As regards the rapidity of absorption of these two compounds, sulphanilyl-guanidine, which is fairly soluble, seemed to be removed from the wound quickly and no remains were macroscopically visible in the wounds of guinea-pigs which died after one to two days; this finding is in interesting contrast with its reputed slow absorption from the bowel, which is

the basis of its use in bacillary dysentery. Sulphadiazine, which is less soluble than sulphathiazole, appeared to be absorbed slowly, and when the wounds were reopened on the third day considerable quantities of the compound were always discovered.—I am, etc.,

National Institute for Medical Research,
London, N.W.3, June 24. F. HAWKING.

Unabsorbable Suture Materials

SIR,—I have been greatly interested in the recent correspondence in the *Journal* on the subject of unabsorbable sutures. For the past twenty years I have used nothing but linen thread (No. 60) for ligatures in the operation of radical mastectomy and have seen no ill effects result. Formerly I used thread exclusively for ligatures in thyroid operations, but an occasional subcutaneous sinus occurred. I therefore substituted fine catgut for ligation of bleeding points superficial to the deep fascia and continued with thread for the deeper ligatures with complete success.

For clean wounds in safe areas thread ligatures have the following advantages over catgut: (1) Thread can be boiled and its sterility is therefore guaranteed. Unfortunately an occasional " batch " of catgut appears to be far from sterile. (2) The tensile strength of thread is comparatively constant while that of catgut varies. With a little experience it is easy to sense how much strain thread will stand and, as a result, ligatures are unlikely to snap. (3) The surface of thread is rough while catgut is smooth and slippery. Consequently thread knots hold more effectively and " slipping " of a properly applied thread ligature is practically impossible. (4) Economy. In operations where a hundred or more ligatures are commonly necessary the cost of thread as compared with catgut is measured in terms of pence instead of pounds.—I am, etc.,

R. J. MCNEILL LOVE, M.S., F.R.C.S.
London, W.1, June 26.

Treatment of Osteomyelitis

SIR,—Mr. H. J. McCurrich's letter (June 14, p. 906) regarding chronic osteomyelitis following war wounds raises several important points in the treatment of this surgical problem.

Once the condition is established in certain situations, one of which he mentions, the problem of treatment is indeed great. Some cases following the last war had infection eradicated by wide guttering operations, notably in the hands of the late Naughton Dunn, but, as Mr. McCurrich points out, it is not uncommon for a man to have a discharging sinus for twenty-five years Having seen many cases of this type I am firmly convinced that, to improve results, we must concern ourselves more with prevention that cure, by recognizing in the initial stage those wounds which are likely to become the seat of a chronic infection. If this is done, more radical methods can be employed in the primary stage of treatment than would be possible some years later.

As an instance I cite the case of a man wounded in the shoulder in the evacuation from Dunkirk. The head of the humerus and part of the glenoid were shattered and numerous metallic fragments scattered in the region. When he reached me the wound was almost healed and surgical intervention was not indicated. Radiographs now show a number of metallic fragments embedded in a shapeless mass of bone at the upper end of the humerus. I do not think that the function of the arm would have been any worse had all these bony and metallic fragments been cleaned out in the first instance, but I do know from previous experience that a chronic infection is likely to supervene in later years, when it will be impossible to do a radical operation short of a forequarter amputation.

The upper and lower ends of the femur are notorious for their ability to hold infection in spite of all treatment, and the answer to Mr. McCurrich's question regarding amputation is that each case must be judged on its merits, and amputation performed before it becomes a life-saving operation. Many patients continue for years with a small dressing which is much less of a disability than an artificial limb.

The suggestion of a centre or colony for these patients is surely already met in the Ministry of Pensions Hospitals, where a large percentage of the cases treated are of chronic bone infections.—I am, etc.,

Liverpool, June 14 W. R. D. MITCHELL.

Marking of Gas-contaminated Clothing

Sir,—In many areas the handling and cleansing of gas-contaminated clothing is the duty of the district engineer, but I expect that some medical officers of health and first-aid post medical officers have taken an interest in the collection and marking of the clothing that may be handled in the cleansing stations attached to hospitals and first-aid posts.

The original suggestion was that the clothing could be marked with metal disks fastened to the garments and then collected in string bags, which could be similarly marked. It is now necessary for cotton and woollen garments to be kept separate, and it is suggested that a tape or disk be pinned to each garment. In this district we have worked out a scheme by which every garment has a tape label attached to it by a stapling machine. This altogether does away with the need for safety pins, which in practice will, in my opinion, prove unsatisfactory. The stapling machines can be efficiently handled by men or women even wearing the clumsy gas protective gloves. The scheme requires that a stapling machine, two rubber stamps, a length of tape, and a pair of scissors be supplied to each side of the cleansing station. When the station is at work every garment will have firmly fixed to it the initial of the station, the date of contamination, and the owner's number stamped upon a small tape. After decontamination it should be a simple matter to return the clothing to its rightful owner.

The advantages are that this scheme offers a simple and efficient method of marking clothing and saves innumerable safety pins.—I am, etc.,

W. F. CORFIELD,
June 27. Medical Officer of Health, Colchester.

Diabetic Coma in Young Diabetics

SIR,—I have read with interest Dr. Leslie Cole's article on diabetic coma in a series of young diabetics (June 14, p. 882), and, while I find myself in agreement with much that appears in it, there are one or two points on which further information would be of value, and one therapeutic procedure advocated which, I think, is not without possible danger. In the description of Case 6, in which severe ketosis, as judged by urinary examination, was absent during the early stages, no mention is made of the presence or absence of acetone in the breath. I have seen several such cases, one quite recently, in which the kidneys appeared to be unable to excrete ketone bodies, but in which a strong odour of acetone in the breath left the diagnosis in no doubt. In such cases it is wise to examine the *serum* qualitatively for ketone bodies by Rothera's test, as this may give a strongly positive result.

Dr Cole rightly stresses the importance of fluids and saline in the treatment of diabetic coma, the administration of which in large volumes in desperate cases was advocated by Lawrence in an article in the *British Medical Journal* of April 12, 1930, and thereby presumes the knowledge that peripheral circulatory failure is an, if not the most, important cause of death in this condition. He omits, however, in his series, to give any records of blood pressure before or during treatment, which is unfortunate because, from the point of view of prognosis and treatment, the level of the systolic pressure is of greater importance than that of the blood sugar, whose chief value is its guide to insulin dosage.

Lastly, under the heading of treatment, Dr. Cole advocates giving " usually not less than 50 units [of insulin] repeated every one or two hours according to the clinical and biochemical progress." In my experience in severe cases of coma the progress either clinical or biochemical made in intervals of one or two hours is often not significant enough to allow of its being safely used as a guide to insulin dosage, especially if such progress is apt to be the combined result of the treatment of dehydration and ketosis, a fall in blood sugar in the early stages of treatment being the outcome of an increase in blood volume as well as insulin action. But even if the progress of the case could be adequately estimated from hour to hour the practice of giving insulin at such frequent intervals is both unnecessary and unwise. Doses as large as 50 units do not exert their maximum action for at least three hours, and, consequently, if injected every one or two hours, constitute repeated additions to an amount of insulin which has not had time to show full evidence of its

action; the cumulative effect so produced not only detracts from the value of blood-sugar determinations as a guide to subsequent dosage but, in hands less skilled than those of Dr. Cole, may easily in children result in severe hypoglycaemia.—I am, etc.,

The Diabetic Department, King's College Hospital, June 17. WILFRID OAKLEY.

Chronic Sick in Bombed Towns

SIR,—The Minister of Health in reply to a question put by Sir E. Graham-Little on the subject of the "chronic sick" in bombed towns stated (*Journal*, June 21, p. 950) that he could not give "the total number of chronic sick still housed in public health and public assistance institutions," etc., "without elaborate and detailed inquiry from a large number of different authorities." The answer given by the Minister is, of course, obviously evasive, as anyone can tell from personal experience of Government Departments, especially in wartime. In other words, if the Minister really wanted to know the total number and to disclose it to the public he would soon find himself and his staff in very hot water. However, in order to help him to grasp the gravity and urgency of this question I can tell the Minister that the figure for London is about 5,000.—I am, etc.,

Criccieth, June 21. FREDERICK MENZIES.

SIR,—Permit me to "confirm by my testimony" the existence of the disgraceful state of affairs in regard to chronic sick patients which has aroused the just anger of Sir Frederick Menzies (June 7, p. 868).

Last October I was a medical officer at a hospital for chronic sick in London—and I should explain that the term "chronic sick" has a precise, defined meaning. It means a patient who is bedridden owing to an incurable illness and is not necessarily synonymous with "senile," as might be inferred from a recent reply given in Parliament by the Minister of Health.

In that hospital we had several hundreds of such patients (over 95% of whom were unable to get out of bed) and, in spite of the fact that we were doing no air-raid casualty work, those patients, strung out on three floors, were left there night after night while bombs missed the building by 20 to 30 yards.

Two questions arise:

(1) *Ought early evacuation to have taken place?*—On balance of reasonable probabilities the building was going to be hit. This was clear to us and clear to the local police authorities, who were gravely perturbed (as I happen to know) by the plight of such a large number of helpless patients. The suggestion that it may be necessary, in the welter of competitive and even Gilbertian priorities alluded to by Mr. Ernest Brown, to leave in the vaunted "front line" such unfortunate people is an unworthy one and one which would have appalled our fathers, who had a firmer grip of the spirit of Christianity than we have.

(2) *What of the future?*—In spite of the apathy of what a modern writer has called "our deplorable Press," the problem of disposal of the chronic sick will solve itself.—I am, etc.,

Portsmouth, May 25. J. C.

Paralysis accompanying Herpes Zoster

SIR,—The note on paralysis accompanying herpes zoster by Mr. G. I. Wilson (June 21, p. 930) suggests that this combination is not excessively rare. I think it never has been very rare, but I believe Ramsay Hunt was the first to describe it under the name "syndrome of the geniculate ganglion." There is an admirable illustration of the condition in Aldren Turner's *Textbook of Nervous Diseases* (my edition is 1910, p. 88). Another point in Mr. Wilson's note is that his patient exhibited a generalized vesicular eruption resembling chicken-pox. This is not chicken-pox but *herpes generalisatus*—a phenomenon not uncommon in old people who suffer from herpes zoster. Stelwagon in his *Diseases of the Skin* mentions this form of herpes, giving some references. I have seen five instances of the condition occurring in the seventh or eighth decade of life.—I am, etc.,

Bristol, June 21. J. A. NIXON.

Bilateral Renal Colic due to Sulphapyridine

SIR,—I think it might be of interest to add to recent publications on this subject an observation of a case of bilateral renal colic due to sulphapyridine.

A private aged 36 was from May 1 to May 10, at the reception ward of his unit, treated for pleurisy. On May 15 he was taken ill again, and on the following day was admitted to our hospital, where the diagnosis of pneumonia of the right upper lobe was confirmed. Mild cyanosis and occasionally vomiting were noticed while on routine sulphapyridine treatment. On May 18 he complained of diffuse pain in the right hypochondrium and kidney region, radiating into the right testicle. The violent pain was controlled only after injection of morphine and atropine. On May 19 the patient experienced severe colicky pains on the left side, followed by complete suppression of urine. The total amount of urine passed in the following twenty-four hours was 3 c.cm., and this had the appearance of blood. Intensive treatment and immediate stopping of sulphapyridine was followed by rapid improvement. An *x*-ray film did not show the presence of calculi, and there were no stones or gravel in the filtered urine, which, however, contained albumin for a few days. The urinary output was almost normal by May 21. The total amount of sulphapyridine given amounted to 20 grammes.

When the first attack occurred we thought of a fortuitous association of renal colic with pneumonia, as it is well recognized that febrile conditions may aggravate latent nephrolithiasis. By the following day the latter diagnosis had to be reconsidered in view of the occurrence of renal colic on the other side, with no history of previous attacks. It was felt that sulphapyridine was the responsible factor, and this view was confirmed as rapid improvement followed the discontinuation of this drug.

This short record of a case of bilateral renal colic due to sulphapyridine is an addition to the considerable number of publications of more or less serious toxic effects of members of the sulphonamide group. In my opinion more careful consideration whether treatment with these preparations is necessary should be given to all cases prior to their administration. It appears to me that the use of sulphapyridine and sulphanilamide—our most potent weapons in the fight against serious infective conditions—should be limited to those diseases where their administration is strictly indicated, or where other measures are likely to fail. The habit of using them in order to be "on the safe side" should be deprecated, and the possibility of sensitization by previous administration should be borne in mind. A common source of overdosage could be avoided if colleagues in charge of military units or in private practice would not transfer patients to a hospital without a short note regarding the amount of sulphapyridine or sulphanilamide given, and the patient's reaction to this treatment.—I am, etc.,

An E.M.S. Hospital, June 5. EMANUEL KOST.

Medical Planning Commission

SIR,—We students in Edinburgh have been following with interest the letters and articles appearing from time to time in your columns regarding the above Commission. Like many of your correspondents we view with concern the composition of the Commission, including as it does not one medical student or recently qualified man. With as much concern we note the apathy with which medical students as a whole have so far acknowledged the presence of this Commission. We were delighted to read Mr. Kennish's letter in your issue of May 10 (p. 738), and tardily hasten to support his views; indeed, we would speak more strongly on the matter and, while fully realizing that the presence of a Medical Planning Commission does not necessarily mean that a plan will be formulated or, if formulated, will be adopted by the Government or medical profession, would point out that, even though the reports to be prepared may not be binding, they will be used as a basis for any future reorganization.

As a result, owing to the exigencies of war, a real wrong will be done to thousands of younger men, who, because they are serving with His Majesty's Forces, cannot give time or thought to the matter, or, because they are still students, cannot take an active part in planning the future of their profession. Realizing that to add more and younger men to the Commission might make it unwieldy, we have outlined the following alternative scheme for consideration.

1. That the reports of the Medical Planning Commission committees, *before* being presented to the Co-ordination Committee, be sent to medical schools, universities, and Home Commands.

2. That each of these medical schools, universities, and Home Commands form local committees, either separate or combined, depending upon size and distribution. Membership would be representative of teachers, younger members of the profession who form the majority in the Forces, and students.

3. These local committees could now, before receiving any report, review the present arrangements in this country, on the Continent, in Scandinavia, etc., as gathered from books in medical libraries and foreign medical men in this country, and so be able to give detailed constructive criticism to reports sent to them by the committees of the Medical Planning Commission.

4. The members of these local committees would be able to discuss matters informally with their colleagues, and obtain information on aspects of the profession with which they normally have little to do.

5. These local committees should make their detailed comments within one month of receiving any report. These reports could then be finally reviewed by the Co-ordination Committee of the Medical Planning Commission.

6. The extra time and work involved is comparatively slight for a scheme concerning the future health of the nation, and the criticism would be representative, wide, and considered.—I am, etc.,

Edinburgh, June 6. J. A. WATT.

The British Medical Students' Association

SIR,—The statement of Mr. H. S. Souttar at the first session of the Medical Planning Commission that he had asked for a memorandum from the British Medical Students' Association calls for a description of that body.

Until May, 1940, the medical students of this country had no organization to represent them. It is true that before the war there was a committee of the National Union of Students, but that was concerned largely with organizing interesting but fruitless annual meetings. The outbreak of war provided many and great difficulties for London medical students, and to attempt a solution of these problems (chiefly those concerned with evacuation and A.R.P.) the London Medical Committee was formed. It was this body which last year called a general meeting of medical students at Manchester, which set up the British Medical Students' Association. The medical commission at the Congress of the National Union of Students held in Cambridge on April 2 to 6 was attended by over 160 students, and a further council meeting is to be held in Cambridge on July 4 to 6 to synthesize reports from the constituent teaching hospitals into a memorandum to be placed before the Medical Planning Commission. This conference will also be addressed by outside speakers, including Dr. Trueta on "The History of War Surgery," and Dr. K. Sinclair-Loutit on "A.R.P. and Students."

Points arising from discussion at the Cambridge Congress include: (1) changes in th emedical curriculum; (2) students' A.R.P. obligations; (3) student health; (4) the future organization of medicine.

1. Changes suggested in medical teaching are: (a) A general course of biology should be introduced as a preliminary to the preclinical subjects. The Americans call it an orientation course, and its object is to give a picture of life in many different forms, rather than a detailed knowledge of a few types. (b) Closer integration of anatomy, physiology, and biochemistry, which, so far as possible, should be regarded as one subject. (c) A more realistic clinical curriculum with more stress on minor ailments and less on major surgery, which for most practitioners is less important; and a sounder grounding in general psychology. (d) More preventive medicine. This involves a new conception of medicine, a conception of disease as being due to biological *and* sociological causes. It involves an inquiry into the social and economic environment as part of every diagnosis. It involves a greater knowledge of social agencies—e.g., of rehabilitation, insurance, compensation.

2. Students should be used in A.R.P. schemes, preferably in their medical capacities. Teaching standards should be maintained as far as possible, in spite of evacuation. We believe that to achieve this the present hospital system should be made more flexible, that beds in municipal hospitals should be available for teaching purposes, and that evacuation of hospitals should be carried out *before* a big raid rather than after it. The big town hospitals should be used only as casualty clearing stations.

3. Student health is naturally a subject of great interest to us. Reports from one hospital of seven cases of tuberculosis (one fatal) are worrying. We have to find out what can be done to reduce the incidence of disease among students. It is entirely up to students to do this.

4. The B.M.S.A., like most medical bodies, desires certain changes in the present system of medical organization. Although we are not finally agreed on the form such changes should take, the feeling, as clearly expressed at the Cambridge Conference, was that doctors have a service to render to the community and that they should not waste their time and energy competing among themselves as to who shall render it. Our aim must be to see that our present knowledge of preventive and curative medicine shall be applied for the benefit of everybody.

The medical profession may not be used to encountering a student organization of the nature of B.M.S.A. Student organizations have so often been regarded with suspicion or contempt and have not been given the opportunity to contribute to the solution of common problems. The invitation of the chairman of the Medical Planning Commission is, therefore, very welcome to us. It is as incorrect to imagine that students do not appreciate the achievements of their elders as it is to think that those achievements have solved all our problems. We have not only the disadvantage of inexperience, but the advantage of it. Some of the present trouble may perhaps be attributed to the fact that power has been in the hands of those whose former idealism has naturally become somewhat tarnished by the experiences of earning a living. We do not pretend that our wisdom is greater than theirs, but we do say that it is worthy of consideration.—I am, etc.,

Cambridge, June 24. DAVID PYKE.

Ship Surgeons and the Medical Personnel on Transports

SIR,—I am much interested in Dr. James Prendergast's letter on "Ship Surgeons and the Medical Personnel on Military Transports" (June 14, p. 904), and would like to support the plea for a better understanding of the role of the ship's surgeon and a more stable position for him.

The position of the sea-going doctor has improved over many years by dint of perseverance on the part of the British Medical Association and the general recognition that the services rendered are very much more than those of merely fulfilling Board of Trade regulations. Although perhaps the more studiously minded are not attracted to the life, yet there are many medical men who go to sea who are not only keen on the sea but are also greatly interested in their profession and jealous in safeguarding its interests and upholding its fine traditions.

It is therefore a slur on the profession as a whole that the word "warned" should be used in the Voyage Regulations to which he refers, and this certainly should be altered. His reference to the S.M.O. and assistant M.O. on military transports is obviously to the point, and when one realizes that there is in addition the ship surgeon, who must sail with the ship, and probably a number of other military medical officers, it does seem apparent that there is an overlapping of duties and an easy opening for friction, not to mention the waste of medical man-power, when, as Dr. Prendergast says, there is a demand for doctors in so many places. It is not logical to call in foreign doctors to our aid when superfluous posts are being filled by our own men.

My interest has been roused in this subject because I have sailed in transports as a military M.O. and have also been a temporary ship surgeon.—I am, etc.,

London, S.W.1, June 13. G. T. CREGAN.

Ether Convulsions

SIR,—Convulsions due to novocain poisoning are rare. I have seen but one mild and three serious cases in well over ten thousand instances where local anaesthesia has been employed. The rarity of the phenomenon, and the exact similarity in every particular of novocain convulsions and ether convulsions, may have resulted in Mr. Charles Wells's (June 21,

p. 945) overlooking the possibility of the novocain's being the cause of the convulsions in the case he quotes. The similarity of convulsions of ether and novocain is heightened by a most important practical observation. In the *Journal* of August 17, 1940 (p. 222), I drew attention to the dramatic way in which these terrifying spasms cease after injecting intravenously a small dose of evipan. In a recent case of novocain convulsions exactly the same pleasing sequel resulted. When I recorded the observation in the *Journal*, I did not know to whom to attribute this marvellous life-saving measure. I have since ascertained that the credit of advocating evipan in ether convulsions is due entirely to Mr. Dickson Wright.

I am unable to subscribe to Mr. Dickson Wright's theory of the causation of ether convulsions—that is, overheating of the body. I could prove readily that in the cases of novocain convulsions I have observed any element of overheating of the body was absent. In the case of convulsions due to ether, as Sir Robert Kelly has pointed out, by the time ether vapour has traversed the tubing leading from the apparatus it is most improbable that the vapour is much over room temperature. Thus, overheating of the body and of the anaesthetic agent is far from proven as the cause. I suggest that a common factor should be looked for in these two types of convulsions. I think it will be found in some chemical agent, common to both ether and novocain, acting on the brain stem of certain susceptible individuals.—I am, etc.,

London, W.1, June 22. HAMILTON BAILEY.

Reactions to Morphine

SIR,—The notes on idiosyncrasy to opium have interested me because of another idiosyncrasy I met recently, which I have never seen described.

The patient was a girl of 20, dying of pulmonary tuberculosis. Other attempts at sedation having failed, pil. morph. hyd. gr. 1/4 was used. After a day or two her mother withheld the pill because it "made her eyes swell." As nothing else appeared to give relief another pill was taken, and I made a special journey to see the result. About eight hours later there was oedema of the right eyelids and over the right zygomatic process. The same effect was present on the left side to a less degree. Incidentally, the patient was lying on her right side. This phenomenon occurred every time the pill was given. Later, morph. sulph. gr. 1/4 was given subcutaneously, with the same result in shorter time.

I should be very interested to know if this effect has been observed before with any frequency.—I am, etc.,

Great Harwood, Lancs, June 22. WALTER CALVERT.

Benzedrine in Post-encephalitic Parkinsonism

SIR,—I am interested in Dr. H. Lovell Hoffman's article (May 31, p. 816) on the effect of benzedrine on the oculogyric crises of Parkinsonism. I have for some time been investigating the effects of benzedrine sulphate as a supplement to stramonium in post-encephalitic Parkinsonism. Though my numbers so far are not sufficient to justify publication of the results, the latter are encouraging as supporting the good results of other writers. Practically all the patients who were at a standstill with high doses of stramonium have improved with the addition of benzedrine sulphate. There has been in all cases so far considerable improvement in their lethargy, slowness, and stiffness, though the salivation has remained unaffected. The comments of some of my patients have been: "Feel that I could jump"; "Can do my housework as I should." It appears that some large-scale trials are warranted in this line of treatment of a most incapacitating disease.—I am, etc.,

Newcastle-upon-Tyne, June 12. N. U. KHAN.

"Carriers" of Tuberculosis

SIR,—A further example of the apparent grouping of phthisis cases about a benignly infected person as described by Dr. James Maxwell (May 3, p. 665), will be found in the autobiography of Mr. Middleton Murry. Three cases are mentioned, two bearing well-known names.—I am, etc.,

Buxton, June 21. GEOFFREY ROBINSON.

Obituary

ADAM BROWN KELLY, D.Sc., M.D., LL.D.,

Glasgow

It is with great regret that we announce the death of Dr. A. Brown Kelly, which occurred at his home of retirement in Helensburgh, Dumbartonshire, on June 22, in his seventy-sixth year. Glasgow mourns the loss of this most distinguished laryngologist and otologist, whose reputation was world-wide.

Dr. Kelly graduated at Glasgow University in 1888, studied in London, Berlin, and Vienna, received the degrees of D.Sc. in 1901, and M.D., with commendation, in 1904. He became a Fellow of the Royal Faculty of Physicians and Surgeons of Glasgow in 1920, and his position in the scientific world was recognized by his university when the honorary degree of LL.D. was conferred upon him in 1932. He was surgeon to the ear, nose, and throat department of the Victoria Infirmary, Glasgow, for many years, and after his retirement under the age-limit regulation was appointed consulting surgeon. He was also consultant in his specialty to the Glasgow Royal Mental Hospital. His eminence in laryngology and otology was recognized by many of the European societies as well as by those at home. He was a Fellow of the Royal Society of Medicine, an ex-president of the Laryngological Section, and president of the Laryngological and Otological Section of the British Medical Association at its meeting in Nottingham in the year 1926.

As to societies on the Continent and in America, he was a corresponding member of the Society of Laryngology of France, of the American Laryngological Association, of the Laryngological Society of Berlin, and the Rhinological Society of Vienna, and an honorary member of the Austrian Otological Society. He edited the *Transactions* of the Section of Laryngology and Rhinology of the 17th International Medical Congress, London. He contributed the article on "Examination of the Pharynx, etc.," to the *Encyclopaedia Medica*, and the article on "Inflammatory Affections of the Pharynx" to Latham and English's *System of Treatment*. In 1912 an international collective investigation of ozoena was organized by Prof. Alexander of Berlin. Dr. Kelly was the representative of Great Britain and the Colonies on the committee, and published in the *Journal of Laryngology, Rhinology, and Otology* three notices of the progress of the work, besides compiling a pamphlet of instructions for workers in the investigation.

It is not possible to notice all his very numerous papers contributed to both special and general medical journals. These papers and addresses, to the number of sixty at least, were presented by him afterwards, bound together, to the Library of the Royal Faculty of Physicians and Surgeons, Glasgow. He did some excellent work for the Library of the Royal Faculty; not only did he catalogue all its books dealing with his special subject but he presented steel shelves to display them in a special bay. A few selected titles of these papers will give some idea of the variety of his work. Papers on the nose include "Vasomotor Rhinitis," "Aspergillosis of the Nose and the Antrum," and "Epistaxis from the Ethmoidal Veins." His studies

of diseases of the antrum of Highmore included "Transillumination of the Antrum" and "Empyema of the Antrum in Infants." Pharyngeal diseases and abnormalities of the pharynx produced thirteen papers, all showing original and painstaking investigation. He suggested a method of recording diagrammatically movements of the vocal cords, and wrote on warfare neuroses of the larynx, and on neurological factors causing immobility of the vocal cords. Of the fifteen papers on the oesophagus, those relating to congenital stenosis and congenital shortening, and nervous affections of the oesophagus, are of special note. The Semon Lecture of the University of London, delivered in December, 1926, on "Nervous Affections of the Oesophagus," was a distinguished effort. In the presidential address to the Section of Laryngology of the Royal Society of Medicine in November, 1917, he made an eloquent plea for original investigation and research into the many unsolved problems of the specialty, and urged younger specialists to pursue their subject from the physiological and pathological standpoints. Dr. Kelly was an active scientific member of the British Medical Association. He was a frequent contributor to the discussions in laryngology and otology, particularly at Cheltenham 1901, Sheffield 1908, Newcastle-upon-Tyne, and Liverpool.

Dr. Brown Kelly evidently possessed the rare gift of scientific research, which he carried on up till a few weeks before his death. He worked in the pathological departments of the Victoria Infirmary, the Royal Hospital for Sick Children, and the Royal Infirmary, and has left a considerable amount of work completed, or nearly so. He was a quiet shy man, diffident when overlooked by others while working, and shunning the publicity of teaching students. Honours came to him unsought. He took no part in public medical life, avoiding office-holding. His only recreation, apart from pathological research, was orchestral music, for which he had a refined taste and appreciation.

Great sympathy is felt for his wife and his son and daughter. His son is in the Medical Service of the Navy. His daughter is well known in Glasgow for her skill and artistry in making pictures of pathological specimens.

Mr. LIONEL COLLEDGE writes:

The passing of Dr. Adam Brown Kelly at the age of 76 will bring feelings of profound regret to all laryngologists to whom the scientific study of their subject has any real meaning. As otology and laryngology have steadily established themselves as independent branches of medicine they have in their independence been drawn into a closer alliance. Laryngology is no longer the province of an assistant physician, nor otology of an assistant surgeon; and, although there are still laryngologists and otologists, many practitioners and even professors now combine the two functions. Brown Kelly always remained an unrepentant laryngologist, but he had a remarkable professional brother in Albert Gray, who confined his work equally to otology. They were not only contemporaries and hospital colleagues, but both spent much of their time in patient and accurate scientific observation and research; both were more than well acquainted with all the foreign work of importance and knew the men who produced it, for they both travelled; and with this broad outlook they were both men of sociable and approachable character and generous in hospitality. These two men of Glasgow for many years held a unique position in laryngology and otology, and always received the warmest welcome in London.

It was towards endoscopy and especially to the study of pathological conditions of the most baffling and elusive of all organs, the oesophagus, that Brown Kelly devoted himself in particular, and his observations on its abnormalities in childhood were made with characteristic care and deliberation. He is perhaps best known to laryngologists as the first, in conjunction with his friend Donald Paterson of Cardiff, to describe that curious form of chronic dysphagia in women, accompanied by anaemia and glazed tongue, which goes by the name of the Plummer-Vinson syndrome. Some have suggested that if this must have an eponym it should be the Brown-Kelly-Paterson syndrome, but he would have been the last to make any such claim himself. This kindly, distinguished man will be missed wherever the laryngologists meet, but it is some consolation to think that he has not gone before he had reached a ripe age.

E. TYTLER BURKE, D.S.O., M.B.

Lieutenant-Colonel Edmund Tytler Burke, D.S.O., R.A.M.C. (ret.), died at Paignton, Devon, on June 14, aged 53. After leaving the Army he took up the study of venereal diseases and settled at Salford, where he was venereal diseases officer of the city and instructor in that subject at the University of Manchester.

He was born at Elgin on April 18, 1888, the eldest son of Mr. W. M Burke, J.P., was educated at Perth Academy and at the Universities of Glasgow and St. Andrews, and graduated M.B., Ch.B.Glas. in 1914. He was an original member of the O.T.C. at Glasgow University. He joined the R.A.M.C. Special Reserve early in 1913 and saw much service in the war of 1914-18: in Gallipoli in 1915 as adjutant of the 40th Field Ambulance; later he was given command of the unit and promoted to major, serving in Iraq from 1916 to 1918, when he was promoted to lieutenant-colonel and served as A.D.M.S. of Forces in Northern Persia, and then in the Caucasus and as senior medical officer at Baku. He was mentioned in dispatches several times, received the D.S.O., and the Serbian Order of the White Eagle (with swords) and the Russian Orders of St. George and St. Vladimir (with swords). Besides his appointments at Salford, Colonel Burke was for some time assistant in the dermatological department of Manchester Royal Infirmary and assistant medical officer to the Northern Hospital for Women and Children, Manchester. In 1939 he became lecturer in venereal diseases at London Hospital Medical School and consultant venereologist to the public health department of the London County Council. He was a member of the British Medical Association and was vice-president of the Section of Venereal Diseases at the Annual Meeting of the Association held at Manchester in 1929. He was the author of many papers and pamphlets on his special subject.

"A. B. S." writes: Colonel Burke's interest in venereal diseases started with an early association with Dr. David Watson, and wherever his Army appointments carried, whether it was Netley Hospital, the Dardanelles, Mesopotamia, Persia, or the Caucasus, the treatment or prevention of V.D. was always uppermost in his agile mind. In 1918 while he was senior medical officer to the British troops in Baku and head of the local medical soviet his administrative abilities enabled him to organize very successfully the public health facilities, which had collapsed during the Bolshevik upheaval. His recent book, *Venereal Diseases*, has some truly revolutionary ideas. It has been said by many that Burke lived before his time, and the future alone will prove whether or no his interesting theories find acceptance. His method of assessing chemotherapeutic efficiency with his "chemotherapeutic index" has not yet met with the support in this country that it has found in America, while his statement that the gonococcus lives as a harmless symbiote in the urinary tract unless disturbed is bound to meet with powerful opposition; it is typical of Burke's fighting qualities and strength of character that he put these ideas into print.

CHARLES WILLIAM LAIRD, M.D.

Dr. C. W. Laird, Consultant Tuberculosis Officer to the Lancashire County Council, died on April 19 at Ormskirk, Lancashire, after a long illness.

Charles William Laird was born at Belfast in 1879. He had a distinguished career at Trinity College, Dublin University, winning many first-class honours and prizes in classics and modern literature. He obtained his B.A. with honours in classics in 1903, and first place at his final M.B. in 1908, with first-class honours in surgery, hygiene, medical jurisprudence and toxicology, and in pathology. At the Royal City of Dublin Hospital in 1907 he also won the Wheeler Gold Medal for first place in the examination in clinical, theoretical, and practical medicine. He took his M.D. in 1911, and the D.P.H. of the University of Liverpool in 1912.

After acting as house-surgeon at the Bootle Borough Hospital, Lancashire, Laird started his career in tuberculosis at the Whiteabbey Sanatorium, Belfast, where he was for a time

acting resident medical officer. He returned to Bootle and there held for over two years the posts of resident medical officer at the Corporation Hospital and assistant medical officer. After a further spell of sanatorium work at the Westmorland Sanatorium, Grange-over-Sands, he was in 1913 appointed one of the first consultant tuberculosis officers on the Lancashire County staff, and for a time also undertook jointly the duties of tuberculosis officer for the County Borough of Bootle. For twenty-eight years Laird was in charge of Dispensary Area 5—north, east, and south of Liverpool—containing some 200,000 acres and a population of 350,000, which included since 1924 the Rufford Pulmonary Hospital, of which he was the visiting medical superintendent. Here he did excellent work, especially with artificial pneumothorax and gold treatment. Courteous and cultured, Laird set a very high standard, never spared himself, and had as a reward the esteem and affection of all his colleagues and the medical practitioners of his area. He was a keen and good golfer, winning many prizes, and, as one would expect from an Irishman, he was an easy and excellent speaker. He leaves a widow and two sons, one following in his father's profession.

Dr. ALBERT G. W. PEARSON, a well-known and greatly esteemed West Hartlepool practitioner, died in a Newcastle nursing home on June 7 in his sixty-eighth year. Dr. Pearson graduated M.B. (with first-class honours), B.S. at Durham University in 1897. After holding house appointments at Birmingham, Sunderland, and Hartlepool, and some experience of practice at Rotherham in South Yorkshire, he established himself at West Hartlepool, where he became widely known as a skilful general practitioner surgeon and as honorary surgeon to the Hartlepool Hospital, where he had formerly been a resident. In 1925 he was joined in partnership by Dr. J. Lithgow. Dr. Pearson's entire life was devoted to his profession; he was a bachelor, and he took only a small part in public and social activities, but no call on behalf of his patients or his beloved hospital was ever disregarded. He was a man who liked to do good by stealth, and not content with giving ungrudging time and service to the hospital, he made it many substantial gifts of valuable equipment which, in accordance with his own request, received no publicity. Any spare time he had was devoted to his garden, but his real hobby, as one of his colleagues writes, was his work. The affection which a general practitioner can inspire by many years of quiet unostentatious work in his locality was illustrated at the funeral service at St. Paul's, West Hartlepool, when the entire staff of the hospital attended, as well as many representatives of civic life and of the professional and business community. Dr. Pearson was a member of the British Medical Association for thirty-five years.

Dr. WALTER ERNEST LLEWELLYN DAVIES, late of Llangitho, died at Llanidloes on June 18, aged 67. A native of Cardiganshire, he was educated at Taunton School and University College, Aberystwyth, and studied medicine at St. Bartholomew's Hospital, qualifying M.R.C.S., L.R.C.P., in 1901. He took the D P.H. three years later, after serving as deputy medical superintendent at the Mile End Infirmary. He was then for a short time assistant medical officer at the Eastern Fever Hospital under the Metropolitan Asylums Board, and then assistant M.O.H. for the Borough of Stepney. He settled in practice at Llanidloes in 1907 and was for a time temporary M.O.H. and school medical officer under the Cardigan County Council; he was appointed district medical officer to the Llanidloes Union in 1915, and honorary surgeon to the local memorial hospital in 1922. Dr. Davies took an active part in public life, serving for two periods as mayor of Llanidloes, and he was High Sheriff of the county in 1929.

The death of DR. SAMUEL J. BARTON, at the age of 89, removes a veteran member of the profession who was for many years prominent in the medical life of Norwich and the surrounding countryside. A student of Trinity College, Dublin, he graduated M.B., M.Ch. in 1873, and proceeded M.D. in 1885. Before settling in practice at Norwich Dr. Barton was for a time assistant physician to the Radcliffe Infirmary, Oxford. He joined the British Medical Association in 1880 and often contributed papers to the Norwich Medico-Chirurgical Society, of which he became a member after election to the visiting medical staff of the Norfolk and Norwich Hospital. On retiring from active work he was elected consulting physician to that hospital and also to the Bethel Hospital, with which he had long been associated. He was for many years medical director of the Norwich Union Life Office. When the B.M.A. held its Annual Meeting at Ipswich in 1900, Dr. Barton held office as vice-president of the Section of Medicine. He was one of the oldest members of the Norwich bench of magistrates, and on June 24 a tribute to his memory was paid by the chairman and by practising solicitors of the court.

Medical Notes in Parliament

The Pharmacy and Medicines Bill, "to amend the Pharmacy and Poisons Act, 1933, to prohibit certain advertisements relating to medical matters and to amend the law relating to medicines" was presented in the House of Commons on June 26 and was formally read a first time. It is supported by Sir John Anderson, Sir Kingsley Wood, Mr. Johnston, Sir Donald Somervell, and Mr. Peake.

London Hospital Sectors

On June 25 Sir FRANCIS FREMANTLE inquired whether effect was to be given to Recommendations 33 to 35 of the Select Committee on National Expenditure with regard to the arrangement and administration of the London Sectors of the Emergency Hospitals Scheme. Miss HORSBRUGH replied that the extent to which effect could be given at the present time to the Select Committee's recommendations on the London Sectors was being considered in conjunction with the several officers and bodies concerned. Certain rearrangements had already been made which would reduce the number of Sectors by one as from the following week. Local authorities were being included in the discussions.

Mental Health Work among Children

Sir FRANCIS FREMANTLE asked on June 25 what arrangements were made for mental health work among evacuated children and in bombed areas, and whether assistance would be given to the Mental Health Emergency Committee for this work. Miss HORSBRUGH said mental health work among children was a normal development of the mental health services and in particular of the School Medical Service, with which child guidance clinics were associated in many areas. A number of hostels had been established for difficult children in reception areas. It was desirable that in every Region some of these hostels should be set aside for children requiring mental treatment and should be associated where practicable with child guidance clinics. A grant from Exchequer funds was made to the Mental Health Emergency Committee in respect of the year ended March 31. Application for a further grant was under consideration.

Pharmacy and Medicines Bill

According to a Ministry of Health memorandum, the Pharmacy and Medicines Bill, which has been introduced in the House of Commons, will repeal, from September 2, 1941, the medicine stamp duty and the accompanying licence duty payable by those who make or sell patent medicines. It will also regulate the sale of medicines and prohibit advertisements of remedies for certain conditions. The patent medicine duties now being given up yielded £1,400,000 in 1920-1, but at present yield only £840,000 a year. The duties are based on Acts dating from 1783 to 1812 which are full of anomalies and difficult to interpret and enforce. Under the present law doctors and chemists may sell "known, admitted and approved" remedies free of stamp duty. It has been agreed by the trade interests concerned in the sale of medicines that doctors and chemists shall have a trading privilege covering that class of remedies. The Bill accordingly provides that, while proprietary preparations not described in the *British Pharmacopoeia* or *British Pharmaceutical Codex*, and certain other types of medicine such as mineral waters and herbal remedies, should continue to be sold by unqualified retailers, all other medicines shall be sold only by doctors and chemists. The Bill also proposes that all medicines (except those made up to meet individual needs) must, on and after January 1, 1942, have on them a statement of their composition or of their active constituents. Advertisements of "remedies" for Bright's disease, cataract, diabetes, epilepsy or fits, glaucoma, locomotor ataxy, paralysis, or tuber-

culosis are prohibited, as also are "advertisements of articles as a means of procuring abortion." The Bill also makes certain other minor amendments in the Pharmacy and Poisons Act of 1933.

Cancer Treatment in Lincolnshire.—Miss HORSBRUGH told Mr. Liddall, on June 17, that combined arrangements for the treatment of cancer in the three divisions of the county of Lincolnshire and in the county boroughs of Lincoln and Grimsby are under the consideration of the local authorities concerned. These arrangements included the provision of a centre for *x*-ray and radium treatment in the city of Lincoln. War conditions had delayed the completion and submission of the arrangements, and the risk of enemy action gave rise to serious difficulties in the use of radium. The Minister of Health was in communication with the local authorities, and hoped that at least an instalment of their proposals might be brought into operation shortly.

Egg Rationing.—Provision for preferential treatment for children, and for sick and delicate people, in egg rationing is under consideration by the Ministry of Food with the help of the Food Rationing (Special Diets) Advisory Committee of the Medical Research Council.

Notes in Brief

The provision of sick bays, particularly for evacuated children, is encouraged as much as possible. Sick bays have been established in 53 out of the 62 counties in England and Wales.

Mr. Brown says that there is no evidence of cases in England in which tuberculous trouble has resulted from immunization against diphtheria, or even that this has been alleged.

The Services

HONORARY PHYSICIAN TO THE KING

Colonel W. C. Paton, M.C., I.M.S., has been appointed Honorary Physician to the King, vice Major-General I. M. Macrae, C.B., C.I.E., O.B.E., I.M.S., who has retired.

MENTIONS IN DISPATCHES

Major T. H. Sarsfield, R.A.M.C., and Colonel C. A. Wood, M.C., Colonel A. C. L. O'S. Bilderbeck, and Captain E. C. Hicks, I.M.S., have been mentioned in dispatches for distinguished services in Waziristan during the period January 1 to December 31, 1940.

CASUALTIES IN THE MEDICAL SERVICES

ROYAL ARMY MEDICAL CORPS

In an Army Council casualty list published on June 21, Major CHRISTOPHER ROWLAND ALDERSON, M.C., M.M., is included as having died as a prisoner of war. During the war of 1914-18 he served as a combatant, first in the ranks and then as a lieutenant in the Royal Engineers, and gained the Military Medal and the Military Cross. After the war he studied medicine at University College, London, and qualified M.R.C.S., L.R.C.P. in 1925. He had held the posts of house-physician at the Seamen's Hospital, Greenwich, and house-surgeon at the Prince of Wales Hospital, Tottenham, before settling at Eastbourne, where he was assistant anaesthetist to the Eastbourne Ear, Nose, and Throat Hospital and district medical officer and examining factory surgeon. He had been a member of the British Medical Association since qualification.

Missing

Captain George Ross Mackay, M.C.

DEATHS IN THE SERVICES

Lieut.-Colonel Sir JAMES REID ROBERTS, Kt., C.I.E., I.M.S. (ret.), has died at Srinagar, Kashmir, aged 80. He was born on January 24, 1861, at Marseilles, the son of W. H. Roberts, an officer of the Mercantile Marine, and was educated at Dollar Academy, Lausanne, the Middlesex Hospital, and the Durham College of Medicine, taking the M.R.C.S., L.R.C.P. in 1884, the M.B., M.S. (with honours) and the L.S.Sc. of the University of Durham in 1885, and the F.R.C.S. in 1887. Entering the I.M.S. as surgeon in 1888 he became lieut.-colonel after twenty years' service, and retired in 1919. Soon after joining he served in the Chin Lushai campaign of 1889-90, on the North-East Frontier of India, receiving the Frontier medal with a clasp; and on the North-West Frontier, in the Hunza-Nagar campaign in 1891, was mentioned in dispatches in 1892 and received a clasp to his Frontier medal. In 1890 he was appointed agency surgeon at Gilgit and began a distinguished career in the political service, in which he spent the rest of his service, except for the last two years. In 1900 he was appointed residency surgeon at Gwalior, from 1901 to 1912 was residency surgeon at Indore, and in 1906 received the additional post of administrative medical officer of Central India, which he held until 1916, when he was appointed civil surgeon of Simla West. He received the C.I.E. in 1911, a knighthood in 1913, and the first class of the Kaisar-i-Hind Order in 1936. After retiring from the Army, instead of returning to England he took service in an Indian Native State, first as a member of the State Cabinet in Jaipur, and in 1932 as a member of the Council of State of Dewas, Central India. Sir James Roberts had been a member of the British Medical Association for forty-six years, and at the Annual Meeting of the Association held in London in 1910 he served as vice-president of the Section of Tropical Medicine.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

The following candidates have been approved at the examination indicated:

FINAL M.B.—*Part II (Principles and Practice of Physic, Pathology, and Pharmacology):* R. M. Archer, G. A. Barclay, E. D. Barlow, D. V. Bateman, R. I. S. Bayliss, W. J. M. Beveridge, S. L. Binderman, P. T. Boyle, K. F. C. Brown, J. P. Bull, D. S. Cadman, E. D. H. Cowen, R. J. R. Cureton, D. Currie, R. Daley, B. Dansie, P. J. R. Deller, J. O. W. Dick, W. M. M. Douglass, J. R. Ellis, R. M. Evans, J. Foley, R. B. Franks, E. C. Glover, R. E. A. S. Hansen, D. V. Harris, F. H. Howarth, E. W. Hyde, G. T. James, R. Jenkins, J. S. Johnstone, R. K. I. Kennedy, A. B. Kinnier Wilson, W. S. S. Ladell, E. F. Laidlaw, J. M. Lipscomb, J. Lomas, J. F. Lucey, G. M. Lunn, H. McColl, F. N. Macnamara, O. D. Macnamara, A. E. de la T. Mallett, D. E. Marmion, R. Martlew, D. V. Milward, G. A. Mott, H. H. Nixon, J. F. North, M. S. M. Palmer, G. H. Parkinson, J. Perrin, M. T. Pheils, G. E. Pinkerton, G. K. Riddoch, K. B. Rooke, R. D. Scott, C. G. R. Sell, A. W. Simmins, A. G. Stansfeld, J. M. Stansfeld, J. G. Thurston, A. J. H. Tomlinson, A. B. Unwin, I. G. Wickes, A. H. Widdup, J. M. Willcox, C. H. Wood, W. B. Young. *Women:* A. E. Burns, M. E. Fitch, E. H. M. Gillieson, J. I. Hallinan, J. W. Shrimpton.

UNIVERSITY OF BRISTOL

The following candidates have been approved at the examination indicated:

FINAL M.B., CH.B.—[1 3 4]G. S. Andrews, [1 3 5]Marie L. Bartlett, [2 3]Cecil M. Drillien, [2 6]J. C. Valentine, R. C. Blackney, N. J. Brown, J. D. Cardale, G. T. Cribb, [4]J. H. P. Davies-Sage, Mary L. Hunt, D. S. Maunsell, H. R. Newman, Christine M. Rendell, F. B. Richards, M. O. Skelton, J. H. Wilkins. *In Group II (completing the examination):* J. B. Tucker. *In Group I only:* K. L. Brown, S. J. V. Gilson. *In Group II only:* Joyce W. Brown, Jean A. Butt.

[1] With first-class honours.
[2] With second-class honours.
[3] With distinction in surgery.
[4] With distinction in obstetrics.
[5] With distinction in medicine.
[6] With distinction in public health.

UNIVERSITY OF GLASGOW

At a ceremony of graduation on June 27 the following medical degrees were conferred:

M.D.—W. I. Walker (with commendation), A. L. McAdam, J. G. Scott.

UNIVERSITY OF WALES

WELSH NATIONAL SCHOOL OF MEDICINE

The following candidates have satisfied the examiners at the examinations indicated:

M.B., B.CH.—*Surgery:* Enid Curran, A. A. Edwards, N. E. France, D. I. Harries, Vera Harris, Margaret W. Hughes, D. F. V. Johnston, Gwenllian M. Lewis,* J. Lewis, J. E. Lloyd, D. K. W. Picken, J. B. Randell,* H. I. Rees, Nest G. Richards, Barbara C. Roberts, Erica M. G. H. Roberts, E. Spickett, J. H. Stranger, E. R. Treasure, J. Williams, O. Williams, G. A. Wright. *Obstetrics and Gynaecology:* M. S. Berkovitz, T. W. Brokovski, J. E. Crane, Sadie M. Davies, A. A. Edwards, Megan B. Evans, W. S. Hill, E. H. Horton, M. E. Humphreys, R. T. James, E. R. Jones, J. H. Joseph, Gwyneth M. Lewis, W. C. D. Lovett, B. F. Martin, T. F. McCarthy, D. McCracken, Betty J. Mollin, D. L. Mollin,* R. D. Richards, D. Shiers, H. G. Williams, R. W. Williams. *Pharmacology:* R. C. Cummin, D. H. Davies, D. M. Davies, D. W. Davies, Margaret Davies, S. C. Dymond, A. J. Evans, R. G. Evans, Margaret A. Griffiths, Phoebe J. M. Griffiths, F. J. Hedden, R. A. N. Hitchens, Lilian Howell, J. I. Hughes, Sarah J. Jenkins, A. E. Jones, A. M. Jones, C. R. Jones, G. N. Jones, Menna Jones, Gwenda M. Lewis, Salathiel Morgan, Ivy M. Morgans, Celia M. Rapport, T. H. L. Rosser, Edna E. Saunders, H. F. Sugden, Mary E. Tighe, D. G. H. Tutton, I. M. Watkin, Marjorie Whitney, G. R. Williams.

* With distinction.

No. 23

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended June 7.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases: a blank space denotes disease not notifiable or no return available.

Disease	1941 (a)	(b)	(c)	(d)	(e)	1940 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	224	16	47	2	11	220	10	54	—	5
Deaths		2	5				—	6		
Diphtheria	818	45	196	24	25	701	41	254	34	25
Deaths	21	3	3	1	—	22	2	6	1	1
Dysentery	114	5	59	—	—	25	10	43	1	—
Deaths			—	—	—			—		—
Encephalitis lethargica, acute	1	—	—		—	3	—	1		—
Deaths			—					2		
Enteric (typhoid and paratyphoid) fever	161	10	33	3	3	59	2	6	6	1
Deaths	2	—	1	—	—	2	1	—	—	—
Erysipelas			41	6	1			40	3	5
Deaths		—	—				—	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	43	3	9	5	3	45	11	9	3	3
Measles	11,597	357	167		19	9,257	29	1,572		44
Deaths	9	1	1	1	—	6	—	5	1	3
Ophthalmia neonatorum	67	—	6		—	95	10	18		1
Deaths										
Pneumonia, influenzal*	816	31	2	3	—	554	30	6	2	19
Deaths (from influenza)	10	2	3	—	7	14	—	3	—	1
Pneumonia, primary			169	9				222	11	
Deaths		31		10			28		11	9
Polio-encephalitis, acute	—	—				1	—			
Deaths		—					—			
Poliomyelitis, acute	7	1	2	—		10	—	—	—	—
Deaths		—	—				—	—		
Puerperal fever	1	1	15	3	1	6	6	16	2	1
Deaths		—					1			
Puerperal pyrexia	122	5	28			150	14	14		2
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	962	51	152	37	29	852	37	114	36	55
Deaths	—	—	—	—	—	1	—	—	—	—
Small-pox	—	—	—	—	—	—	—	—	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus	—	—	—	—	—	—	—	—	1	—
Deaths			—	—	—			—	—	—
Whooping-cough	3,774	135	312		2	608	9	39		18
Deaths	24	1	8	—	—	2	—	1	1	—
Deaths (0-1 year)	293	9	40	30	8	324	49	71	22	18
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	4,412	558	664	214	127†	4,577	757	677	197	142
Annual death rate per 1,000 persons living			14.5	14.2	—			13.7	13.2	12.5
Live births	4,620	334	911	304	173	6,381	996	896	371	258
Annual rate per 1,000 persons living			18.5	20.2	—			18.1	24.8	22.7
Stillbirths	187	14	40			228	24	44		
Rate per 1,000 total births (including stillborn)			42					47		

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland. † Owing to evacuation schemes and other population movements it is no longer possible to give birth and death rates for Northern Ireland.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

For the second successive week the important notifiable diseases declined in England and Wales with the exceptions of dysentery and enteric fever. The former increased but slightly, while the latter increased by over half. In Scotland, on the other hand, the incidence of dysentery rose considerably, while that of enteric fever fell almost proportionately. In both countries these diseases are much more prevalent than at the corresponding period last year. Despite the decline observed in respect of the other principal diseases it is noteworthy that they still remain more prevalent than in 1940—notably whooping-cough, which is more than six times as frequent.

Enteric Fever

Despite the numerical increase of cases, fewer areas—twenty-three instead of twenty-five—were involved, and again about one-half came from the adjacent counties of Warwick, Worcester, and Stafford. This outbreak, one of paratyphoid B fever, originated in the city of Birmingham about the middle of May, since which date there have been eighty-five cases in the city itself and ninety-eight in the surrounding areas served by a firm of manufacturers of cream cakes. All uneaten cakes were destroyed and no further supplies were made, and this measure resulted in a rapid diminution of the number of notifications, although some secondary or contact cases are likely to follow. Investigation has revealed that some of the staff concerned with the preparation of the cakes were transient carriers, but no chronic carriers were discovered. The artificial cream used in the manufacture of the cakes was not found to contain paratyphoid organisms. The principal centres of enteric fever during the week were: Warwick 51 (Birmingham 33, Coventry 4, Kenilworth U.D. 1, Royal Leamington Spa M.B. 1, Rugby M.B. 1, Solihull U.D. 2, Stratford-on-Avon M.B. 1, Sutton Coldfield M.B. 5, Meriden R.D. 1, Tamworth R D. 1, Warwick R.D. 1); Worcester 25 (Bromsgrove U.D. 1, R.D. 2, Halesowen M.B. 6, Kidderminster M.B. 10, R.D. 1, Oldbury M.B. 3, Redditch U.D. 1, Martley R.D. 1); Stafford 10 (Smethwick 3, Wolverhampton 3, Tettenhall U.D. 2, Wednesbury M.B. and Lichfield R.D. 1 each); Somerset 14 (Taunton M.B. 10, R.D. 4); London 10 (Kensington 1, Lambeth 4, Wandsworth 5); Leicester 9 (Leicester 3, Barrow-upon-Soar R.D. 5, Melton Mombray U.D. 1). In Scotland, of 32 cases of paratyphoid B fever 21 were in Dundee, and 2 each in the counties of Angus, and Ross and Cromarty, and in the burghs of Glasgow and Perth.

Dysentery

Six additional administrative areas were affected with dysentery compared with the preceding week, but only in 3 were there more than 9 cases notified—viz.: Lancaster 28 (Blackburn 4, Liverpool 1, Manchester 1, St. Helens 2, Lancaster M.B. 1, Walton-le-Dale U.D. 1, Blackburn R.D. 6, Preston R.D. 3, Whiston R.D. 8, Urmston 1); Yorkshire, West Riding, 20 (Bradford 13, Huddersfield 2, Leeds 1, Sheffield 1, Shipley U.D. 3); Sussex, East, 16, all in Uckfield R.D. On the evidence presented here it would appear that dysentery attacks rural communities more frequently than highly populated areas, but the constantly changing character of the population makes it unsafe to generalize on such scanty data.

Trichiniasis

Recently a fatal case of trichiniasis in a woman of 69 years was recorded in London. The woman's illness was due to ingestion of rissoles prepared from pork sausage meat. The presence of fatty degeneration of the heart was apparently the chief morbid process causing death, aggravated by the lesions of trichiniasis in the diaphragm. The importance of thoroughly cooking all articles of food containing pork hardly needs stressing after the publicity which has recently been given to this subject.

The honorary degree of Doctor of Law of the University of Toronto has been conferred on Lady Eaton, widow of Sir John Eaton, for the munificent benefactions made by her late husband to the Faculty of Medicine some years ago and by her, which made possible the establishment of the chair of medicine known as the Sir John and Lady Eaton Professorship in Medicine.

Medical News

The Vegetable Drugs Committee recently set up by the Ministry of Health and referred to in the *Journal* of June 14 (p. 891) has on it the following medical men, under the chairmanship of Sir Weldon Dalrymple-Champneys: Major-General Sir Ernest W. C. Bradfield, F.R.C.S., Mr. J. M. Johnston, F.R.C.S., Dr. W. P. Kennedy, Dr. A. G. H. Smart, and Prof. L. J. Witts.

The Derry Gardens, Kensington High Street, W., will be open for the benefit of St. Bartholomew's Hospital from Monday, July 7, to Saturday, July 12, each day at 9.30 a.m. till 6 p.m., except Saturday, when they close at 1 p.m. Lord Horder opens on Monday, July 7, at 11.30 a.m., Lady Dawson of Penn on Tuesday, and Mrs. John G. Winant, the wife of the American Ambassador, on Friday.

A meeting of the Bristol Division of the B.M.A. will be held in the Physics Lecture Theatre at the Royal Fort, University of Bristol, on Thursday next, July 10, at 3.30 p.m., when there will be a symposium on "Casualty Surgery in Air Raids." All members of the Association and medical non-members will be welcome.

Benzyl cinnamate and chlorocresol (*B.P.* Third Addendum) are not chargeable with purchase tax unless put up for medicinal or veterinary use.

The honorary degree of Doctor of Science has been conferred at the McMaster University, Hamilton, Ontario, on Dr. Donald Church Balfour, director of the Mayo Foundation and past-president of the American College of Surgeons.

The Academy of Sciences of the U.S.S.R. has awarded the Pavlov prize for 1940 to Marie K. Petrowa, professor of physiology in the Pavlov Institute for Physiology and author of valuable work on experimental neuroses.

The South African Institute for Medical Research in Johannesburg is about to undertake the manufacture of yellow fever vaccine under the direction of Dr. G. M. Findlay of the Wellcome Research Institute of London.

There are 7,000 doctors in Australia, of whom 500 are women, 1,170 are men over 60, and 1,500 are engaged in essential services. About 250 are medically unfit, if mobilization became necessary, for which 1,200 doctors would be required, leaving only 2,280 for the civil population of 7,000,000.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

Authors desiring REPRINTS of their articles must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

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B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

QUERIES AND ANSWERS

Generalized Pruritus

"K. H. P." asks for suggestions in the treatment of a woman aged 75 with generalized pruritus, thick pigmented skin in a girdle below the breasts and in the axillae and groins (which are hairless), and large patches of warty growths on the forearms, thighs, and calves. She complains also of epigastric pain and vomiting. The symptoms have extended over the past six months and have resisted all anti-pruritic treatment.

The Pain of Herpes Zoster

"F. P. L." (Cornwall) writes in reply to "M.B., B.S." (June 7, p. 876), who asked for a remedy for herpetic pain: I had a very severe attack of herpes zoster two years ago. The pain was unbearable at times in spite of aspirin, a compound preparation of aspirin and phenacetin, and Dover's powder; even half a grain of morphine by mouth gave little relief. I then got electrical treatment by some special short-wave apparatus which had proved very beneficial in similar cases to mine; but it gave me only partial relief. Finally ionization was tried. This acted like a charm, and after three applications the pain disappeared and I have had no recurrence since then. I should be glad if your correspondent would try it and let me know through the *Journal* if the result is as good as I found it.

LETTERS, NOTES, ETC.

Coined Medical Words

Dr. S. W. SUTTON (Hook, Basingstoke) writes: Dr. W. A. Brend (June 14, p. 885), looking about for "a Greek cloak," suggests hyperphobosis (p. 887). May I suggest a slight amendment, because hyperphobosis would be a Greek blunder. It should be hyperphobesis. Let me reason from analogy. We are familiar with phimosis, which is a correctly coined word because the corresponding verb is φιμόω. But the verb to fear is φοβέω, not φοβόω. If Dr. Brend will kindly look again at Liddell and Scott, he may see the word ἀντιβόλησις (antibolesis), and the corresponding verb ἀντιβολέω. By analogy we should have phobesis and hyperphobesis from φοβέω. Kindly allow me another suggestion Dr. Brend aptly refers us to Job iv, 13, 14: "Fear came upon me." In the Greek, fear in this verse is φρίκη (shuddering). While hyperphobesis is long and coined, phriké is short and classical.

Treatment of Burns and Blisters

Dr. J. PRICE WILLIAMS (Ambleside) writes: This deals only with a point in the first-aid local treatment of burns, and has nothing to do with the nature of any more thorough subsequent treatment. Dr. Louis Sheldon (May 31, p. 833) says "we prick all blisters." Why? There is no theoretical ground for thus interfering with the natural process of repair and the protection of the underlying raw and absorbent surface which the unbroken blister affords. The idea that the contents of the blister are immediately dangerous or likely to become dangerous in a few hours cannot be supported by any pathological evidence. As a result of practice (limited in amount but spread over a good many years) I am quite convinced that healing takes place much more favourably if blisters are left unopened until there is some definite indication that they have begun to "go wrong," and in the majority of cases of moderate severity that does not happen if the blister is cleaned externally and protected from injury. I gave up pricking blisters many years ago and have never had the slightest reason to regret it. What the surgeon in the hospital may decide to do is no concern of mine or of the first-aid surgeon, but I do maintain that the pricking of blisters as "first aid" is not only no help to him but may actually "queer his pitch" if a few hours elapse before he can tackle the case. I suggest that the pricking of blisters is meddlesome surgery, unless it is part of a thoroughly well-planned technique which can be carried out immediately, and is bad practice.

Simplified Formula for Baby Feeding

Dr. T. CRISP (Chorley) writes: I feel that the following simplified formula for baby feeding which I have used for twenty-six years will be of value to others. Children on this feeding have developed in every way satisfactorily—mentally and physically—and have also shown a high degree of resistance to disease. The first child for whom I ordered it was showing signs of rickets, which soon disappeared and he became normal in every way. During the first month, starting at seven to fourteen days from birth, take one level teaspoonful of oatmeal and pour on to it 2 oz. of boiling water; add 2 oz. of Grade A milk (or T.T.), one teaspoonful of cream, and one teaspoonful of sugar. Use a boat-shaped bottle and pass a steel knitting needle through both teats in order to permit the oatmeal to be sucked through the teat. During the second month the feed should be two level teaspoonfuls of oatmeal, 2½ to 3 oz. of boiling water, 2½ to 3 oz. of milk, one teaspoonful of cream, one teaspoonful of sugar. At the fourth month, one level tablespoonful of oatmeal, 4 oz. of boiling water, 4 oz. of milk, one teaspoonful of cream, one teaspoonful of sugar. At three to four months and onwards the child should be given pieces (too large to swallow) of raw turnip, raw apple, raw potato, or a chop-bone to suck or bite so that teething may be helped. From the first month a few drops of orange juice or grape juice may be given from an egg-spoon or even a few drops from the yolk of a soft boiled egg. A female child who was tried on every artificial food that was recommended to the mother, continued to vomit, and was 1 lb. lighter at 10 months than she was at birth, took to this feeding and has since reached adult life and is in every respect a perfectly healthy young woman, showing not the slightest sign of the early starvation. The cream can be obtained by skimming the milk.